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Better Beer!

Vol. 24 No. 6 November/December 2001 The Journal of the American Homebrewers Association

ZYMURGY

FOR THE HOMEBREWER AND BEER LOVER

Hops, Hops and More Hops!

Extreme Hopping: Beyond IPAs

A Veteran View on Hops

Hop Processing and Products

The Essentials of Hops

Plus:

The Other Cider Called Perry

Trippel Yeasts Evaluated



A Publication of the Association of Brewers
www.beertown.org



Thanks to kits,
he's consistently
serving up
winners.

*"It tasted just as good -
if not better - than
many a pint I've drunk
in London pubs."*

Richard Neill
'Weekend Telegraph' (April 99)

*"I wouldn't have
believed that a kit beer
could be so good"*

Roy Bailey - Beer Correspondent
CAMRA's 'What's Brewing' magazine (April 2000)

*"It resulted in as good a
home-made beer as I
have ever tasted"*

Maximum 5-point rating in kit review
'Bizarre' magazine (September 99)

This man is a dedicated brewer. But he also loves to play tennis.

More and more his brewing was keeping him at home when he wanted to be out in the sun. Then he discovered Smugglers Special Premium Ale, Old Conkerwood Black Ale and Midas Touch Golden Ale - the Premium Gold range of brewkits from Muntons.

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Forgive me father, for I have sinned.

Yes, it's a great hobby but surely there's more to life than homebrewing? Beer lover Roger Bacon comes clean and admits to using kits.

confess! Those empty kit tins you saw in the trash were mine. But do you know something? The beers tasted great! Maybe it's years of thinking the only way to a masterful brew is the hard way - full grain mashing. Maybe I was just kidding myself. But somehow I don't think so. They just tasted really, really good.

It all started when I snuck into my local homebrew store a month or so back. I was there to buy my usual mash grain but I committed the ultimate sin. Maybe it was the attractive packaging that lured me. Before I could stop myself I was busily reading the notes on a 'Midas' Touch Golden Ale Kit from Muntons. And it all sounded so easy and delicious. And my life had been so complicated of late. OK call me weak willed but I just thought "do it! If it turns out bad, no one will ever know." My ordeal wasn't over. The next thing I had to do was try and convince Brad, the store owner, that the kit was for somebody other than me. See, Brad is a member of the same brewing circle as my father and the last thing I wanted was a vicious rumour about my brewing antics reaching dad's ears! But even

Brad reckoned the kits were great. He told me he'd been using them for the past two years and he thought the whole range tasted superb.

Now I was really confused. If guys like Brad were using kits then surely they must be OK.

So as soon as I got home I had a quick look at the instructions and decided to get the brew underway. It was so easy. I put the cans in some hot water to soften the concentrated wort inside. While this was happening I boiled up 6 pints of water, sterilized my fermenter, mixing spoon and jug. I added the boiled water to my fermenter, added the contents of the cans (which poured in easily) stirred them together and then added a further 34 pints of cold tap water. When this was fully stirred I added a sachet of Premium Gold Yeast, sealed the lid of the fermenter and that was it. It took no more than twenty minutes from start to finish. I remember thinking "This will never taste any good, it's just too easy."

How wrong I was. A few days later I lifted the lid and was greeted by the warm, sweet smell of a quality brew in the making. Years of mash brewing had taught me the signs and

every good brewer knows when something exceptional is developing.

Now I was beginning to get very excited about the Midas' Touch Golden Ale that gurgled like a baby in my fermenter. After two weeks when all was still, I carefully transferred the wort into the barrel. The beer was already a gorgeous rich golden color and it had a delicious aroma of bitter hops and top quality English malt. But I still had to wait. I killed time by reading. I took my wife to the movies. I helped the kids with their homework! I was a free man and yet I was obsessed with the contents of that barrel. It was like being a convict counting down the days to freedom.

And then the day came. It was ready. All was quiet. I'd selected my favourite tasting glass from the kitchen and made my way to the basement where my Midas' Touch Golden Ale was waiting. I polished my glass, held it under the spout and opened the tap. The sound of the beer as it foamed from the spout was soft yet energetic. As the glass filled I could see the beautiful golden color collecting at the bottom of the glass as the bubbles rose to form a creamy head. I closed the



tap and held the brew to the shaft of light that fired into the room. The beer was clear and bright and I could wait no longer. First my nostrils were met by an intoxicating hoppy aroma. Then my lips met the soft caress of the creamy head and I was fully rewarded with the delicious taste of the beer itself. The clean, malty sweetness was beautifully balanced with bitter hops. The beer was light yet strong, delicate yet decisive and wholly refreshing. I stopped drinking and as I admired the color once again I was astounded by a wonderful aftertaste that glowed from the back of my tongue. Kit or no kit this beer was something very special indeed. I beckoned my neighbor over from his yard. "Try this Tom" I said. "Wow" he said, "I haven't tasted beer like that for years. Is it your father's recipe?" I did not answer him. I just smiled and poured us another glass.



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

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ZYMURGY®

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

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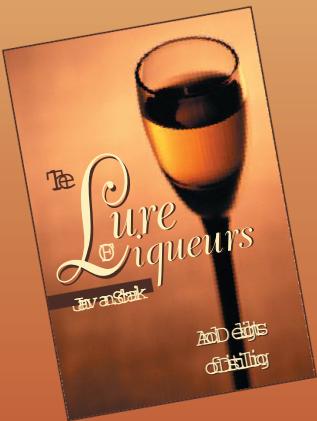


The Lure of Liqueurs

Jan Van Schaik

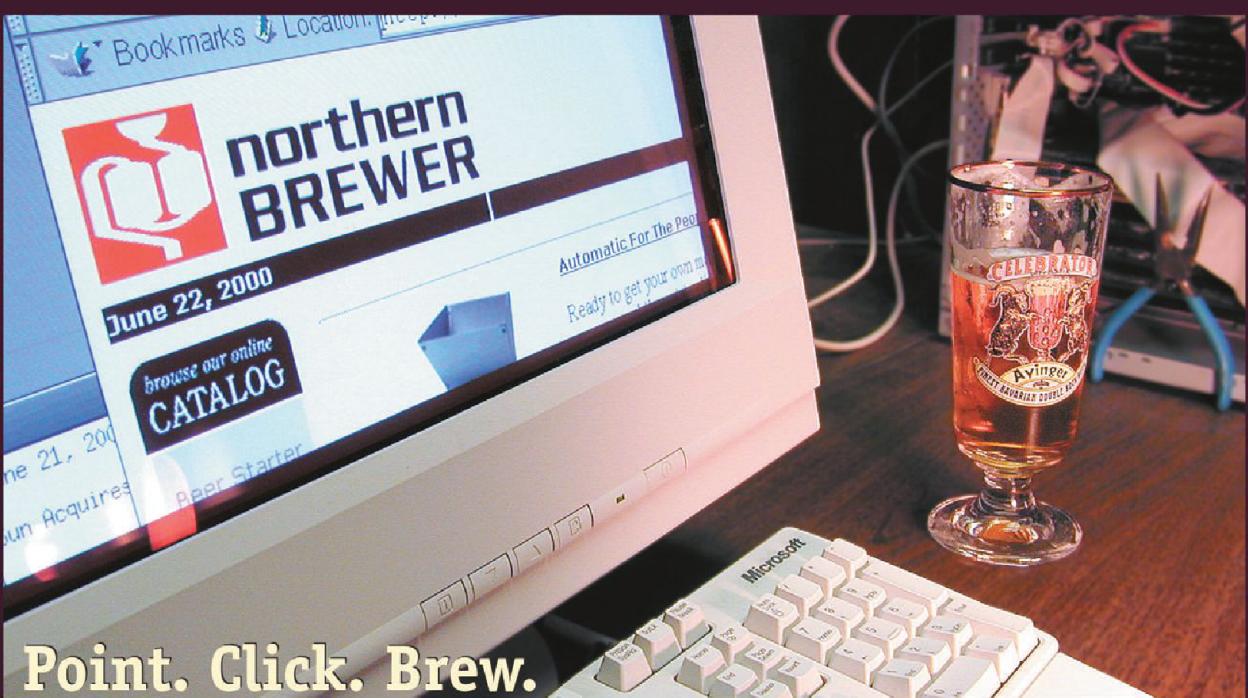
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Making liqueurs at home is more than a sensory experience. It's inexpensive—consider the prices of famous, name-brand classics—easy, and enjoyable to make. The author focuses on the simplicity and healthful features of using fresh fruits, berries, herbs, and spices—preferably from one's own garden—to produce a perfect liqueur. Instructions on growing and processing your harvest are also presented.

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Teach a Friend to Homebrew Day

The first Saturday of November will again be Teach a Friend to Homebrew Day. (Yes we're still looking for a catchier name. Got any ideas?) This year that day lands on November 3rd. I am intrigued by Charlie Papazian's World of Worts column that appeared last month involving timing a brew day to accompany televised football, so if anyone wants to brew on Sunday the fourth instead (or also), go for it.

We had a great success this past May with the site membership coordinators generating over 50 new American Homebrewers Association memberships from amongst our nearly 200 sites. The association would really benefit if we replicated that success with a wave of new members.

There is a site registration form on www.beertown.org if you would like to participate in Teach a Friend to Homebrew Day. As I mentioned last year at this time, a regular supply of new blood is vital to the long-term health of the hobby of homebrewing. New customers keep retailers in business, keep the store stock fresh and keep manufacturers making fresh product. If any registrants would like a copy of *Zymurgy for Beginners* for apprentices that day, visit your shop for one or let us know.



Zymurgy for Beginners

Zymurgy for Beginners shipped to 191 homebrew supply shops on September 20th. I appreciate all of the shops that are participating in the distribution of the project. As I mentioned in my last column, this project is a vehicle to give a supporting hand to new brewers and introduce them to the American Homebrewers Association.

Give the Gift of Beer

One of our biggest membership drives of the year accompanies this issue. If you have

a friend who homebrews or loves beer who is not an AHA member, go ahead and sign them up with a one-year gift membership. It will likely encourage them to make more homebrew, which you can sample when you go to their home. If you picked this issue up at a newsstand or homebrew supply shop, give yourself the gift of beer with an AHA membership and be a part of the larger homebrewing community.

End of 2001 Thanks

This year has been quite a homebrewing odyssey filled with an awesome AHA conference, growth in a well run National Homebrew Competition, AHA clubs gathering for good times and tasty brews and some of the finest *Zymurgy* issues ever. I can't recognize everyone who volunteered to do a piece of AHA program work this year. There are hundreds of Big Brew and Teach a Friend to Homebrew Day site directors, judges, sorters, stewards and competition directors, legalization advocates, club liaisons, conference organizers, etc.... The AHA is all of you and on behalf of the staff I would like to say thank you; thank you for all your hard work and making AHA what it is.

Our sponsors and advertisers also allow us to accomplish more than we could without their financial support. I think of Boston Beer Company, Rogue Ales, Munton's, John Bull, Briess Malting, White Labs and Wyeast as the biggest supporters of homebrewing and the AHA out there. I feel good when I buy any of their products, because I know some of it comes back to support homebrewing. Thank you, thank you.

I wish you all a wonderful holiday season, filled with warm fires and cool mugs of spiced winter ales and barleywines and stouts. See you around the brew kettle.

AHA Director Paul Gatzza has 125 year old miners hops in his yard.

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BY RAY DANIELS

Rogue Hops

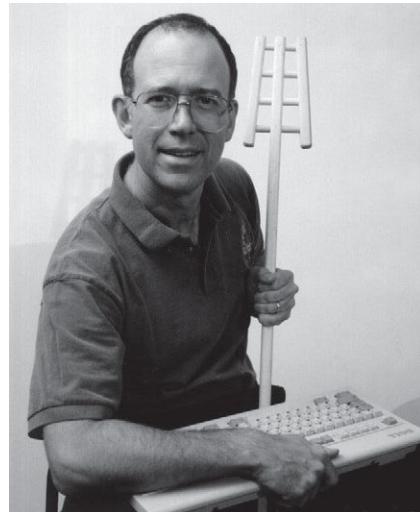
Giddy glee shuddered through me the first time I got a good hop rush. I'm sure you remember the experience yourself: that clean, crisp bitterness under a spicy-citrus hop flavor that hums on your palate like an expensive sports car cruising at 90 miles an hour.

It helped that I had created the beer myself. My third homebrew was an India Pale Ale that was, as far as I was concerned at the time, the best beer I had ever consumed. When I drank it, I smiled—and my friends did too. From that moment on, "homebrewer" has been a part of my personal identity.

"Hop head" was another moniker I learned to accept. As I brewed more beers and met more brewers, I found that I liked a lot of hoppy beers. And as I came to select from a very wide universe of beers—both homebrewed and commercial—for my daily consumption, I found that the hoppy ones tended to disappear much more quickly than the others. Little did I know that my tongue was a battlefield for those bent on worldwide beer domination.

It turns out that hops are aggressive little suckers. One might have guessed this based on the rocket-like growth of their vines each spring. Any plant that can grow up to a foot in a day has to be motivated by something more than just sunlight and good fertilizer. Clearly hops have a mission. A mission driven by malt jealousy.

You can't make beer without water or yeast—and in most cases, their contributions don't dominate the flavor of the finished product anyway. But malt is different. In addition to sugar, it gives a huge bolus of flavor to beer. From sickly-sweet caramel malt tones to the roasted black-malt bitterness and on into six-row graininess, malt simply defines beer in most cases. Indeed, hops might be forgotten altogether at times



if government regulators didn't require them in some minimum amount.

Beyond that, there is history: hops are the Johnny-come-lately of beer. It is only in the past 500 to 600 years that hops have been a part of the blend. Prior to that time, other substances were used to provide bitterness and balance in fermented malt beverages. When hops did come on the scene, they had to battle for acceptance. Advocates ranging from Cardinals to commoners fought the inclusion of hops in our noble brew. Their motivations usually revolved around issues of finance more than flavor—although one does hear of the occasional purist who actually preferred the piercing, sometimes carcinogenic bitterness provided by other substitutes.

Clearly hops would not have gained and held the defining position they have achieved in beer without some persistent and aggressive effort.

I myself wonder if the little guys possessed the innate chemical complexity that we now appreciate when they first happened on the scene or whether they devel-

oped it as a part of their domination strategy. After all, the thing that makes hops so valuable in brewing is not only their ability to bitter, but to flavor attractively as well. And these capabilities come from different parts of the hop: resins give us bitterness while oils contribute aroma and flavor components. Did the first brewers to use hops see and appreciate these traits? Or were they discovered later? Did the hops—perhaps sensing a chance to progress from a wild, weed-like life to that of pampered, cultivated crop—see the need for flavor complexity and goose that oil thing just to help their cause? I suppose we'll never know, barring the discovery of a well-preserved bag of medieval hops in a European glacier some day.

We know that Europe, the home of hops, still has many highly hopped beers. Beers in which bitterness exceeds that of American mass-market brews by two- and sometimes threefold. Beers that display hop flavor as a marked feature of the flavor profile; beers with enough hop aroma to induce malt amnesia. Clearly this is the result of work by the noble old hop lines of Europe who first established the place of hops in beer. Families like Hallertau, Saaz, and Goldings have had 500 years to secure their place in the brews of Europe and they are careful to guard that position jealously.

Not so in America. For many generations, the raucous hops of America lacked both the power and the refinement of their European cousins. With their unique character and recent weedy origins, these American Lupulons were like the land they inhabited: a bit wild and rough. Furthermore, they were no match for the combined efforts mounted by malts descended from ancient Asian stock and powerful corn adjuncts that had come to dominate American beer.



ASK DR. WHITE

Dear Dr. White,

What makes a beer or yeast dry? And does that mean if it's not dry it's therefore sweet?

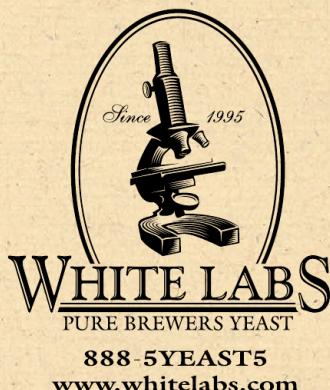
Bill Hudson

Hi Bill,

A dry beer is one that has less residual sugar levels in the final product. Yeast consume wort sugars in a specific order, until the relatively large sugar maltotriose is left. Some strains can ferment this sugar better than others strains. A strain or combination of yeast strains that ferment a large percentage of the sugars will produce a dry beer. An attenuation of 80% will produce a drier beer than one that has an attenuation of 65%. If you want a dry beer, chose a yeast strain that has a high apparent attenuation number, like White Labs' California Ale or German Lager.

**Chris White, Ph.D.
President, White Labs**

White Labs invites you to enjoy the Holidays with the attached Yeast Selection Poster, featuring over three dozen international strains of White Labs Liquid Yeast.



In the face of this venerable competition, hops in America had become resigned to a secondary position in beer. True, there were some rebellions and some tentative beachheads in the never-ending malt-hops wars, but nothing with any lasting impact.

Then came homebrewing. And after it craft brewing. Corn was banned. Domestic malts were shunned. And most importantly, the noble lines of European hops carried on a passionate and prolific affair with their unpolished American kin. The resulting offspring took traits from both cultures, combining American strength and hardness with a measure of European refinement and subtlety.

But the new generation of hops also brought another important trait from their European forebears: the will and the savvy to fight. The battle was joined.

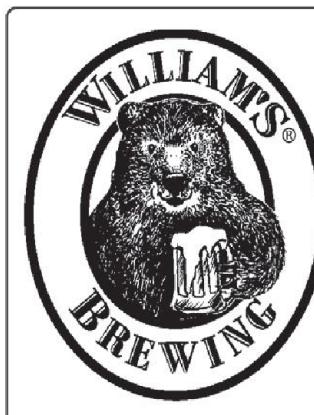
Brewers did their usual job of bringing hop platoons to the front lines. From there it was up to the troops to make things happen. Recon units plotted the path from cooler to kettle and then the artillery started to loosen things up with a few well-placed plugs through the kettle door. Soon full-scale invasions were mounted on many battlegrounds. Whole regiments were being sacrificed to put more bitterness, flavor and aroma in America's new brews.

Brewers tasted these newly invaded beers and pronounced them good. They rationalized the hoppiness by reference to classic European beers (of which they had only read) and then gave them names that proved the point, calling them "bitter" and "IPA."

On most bines of the hop world, the Lupulons understand that balance in beer is essential if they hope to hold on to, and even expand, their hard-fought gains. But some rogue elements have formed which will stop at nothing short of the total imperceptibility of malt flavor. These rogue hop bands hide along the Pacific coast with guerrilla cells based near brewpubs from San Diego to Puget Sound.

The brewers in this region have adapted to these guerrilla tactics through a variety of means. Some have simply allowed their palates to adjust. Like top chefs who become immune to the spices they use, some US brewers have become acclimated to higher and higher hop levels—unaware that the building bitterness has, in some cases, exceeded all standards of decency. Some unsuspecting European brewers, accustomed to America's widely-known wimpy beers, have been stunned into semi-permanent palate paralysis by the hopping of these new beers.

Another factor in the success of this radical hop domination strategy is the sleep factor. Hops have a well-known soporific effect on humans. No doubt this weapon has been used effectively in the current war. Reports of hop aromas interrupting meetings between brewers and some malt-sympathizing owners have been received. In other cases, brewers bent on lower hop levels have simply been taken away to sleepyland during key moments of the boil. By hook or by crook, these hop guerrillas are finding ways to minimize perceptible malt flavor to near eradication. (continued on page 63)



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Kudos to the Traquair Clone

Dear *Zymurgy*,

I thought you might be interested to know that the Traquair House Clone Beer recipe from a while back took "Best Ale" in a recent BJCP 50-plus beer competition (the Douglas County Fair in Nebraska). It only lost by one point for best of show, but since that one was one of my beers also (an Oktoberfest), I wasn't unhappy. Interestingly, it had only cold-conditioned for two months—I just drew off a half gallon and primed with Primetabs to enter it. Now I have 4.5 gallons left, and I know it will be wonderful late this Fall!

Marc Pullum

Dear Mark,

Thanks for the kudos on the recipe, but the quality of all beers depend on the skill of the brewer. The fact that you can win awards with your homebrew is testimony to your skill! By the way, we get awfully thirsty here at the AHA...

—Editor

Love Those Columns

Dear *Zymurgy*,

I have really enjoyed the articles "Clone Beers" and "Brewer's Favorites," and always look forward to seeing what you have covered each month. I have brewed a few of the clones (Schlenkerla Rauchbier, Traquair House Ale) and both were great! I was wondering where you get the recipes from?

Nathan Zorich,
Seattle, WA

Dear Nathan,

We're happy you like those columns in *Zymurgy*. The bulk of the recipes in *Clone*



Beers come from Amahl Turczyn's own brewing records. A hopeless homebrew fanatic since the 80s, Turczyn tries to brew every weekend, and to never brew the same recipe twice. So he's filled up quite a few recipe books.

—Editor

Will the Real Carapils Please Stand Up?

Dear *Zymurgy*,

In the September/October 2001 edition of *Zymurgy* I was reading the "Cara-Correction" article by Sabina Weyermann and was surprised to read that Carapils is a registered trademark of Weyermann Malting Company. Not very long ago I was reading about Carapils malt and how it was a registered name and that when you were brewing using a partial mash recipe you had to be careful which dextrin malt (Carapils) you used because some of them needed to be mashed and some did not. Upon further investigation I found that the Carapils made by the Briess Malting Company needed to be mashed. Now when I look at the Briess website (www.briess.com) it says that Briess Malting Company has a registered trademark for Carapils!! Is that possible? Can

Carapils be registered in the U.S. to two different companies?

Bob Barrett

Dear Bob,

We-e-e-l-l-l, it looks like we stepped in the week-old spent grains on this one. The bottom line is that both companies claim ownership of this term but there is some debate as to who has the right to use it at present. Since there are discussions underway that involve lawyers, we're going to remain mute on the subject. We think that they both make wonderful malts and that a little dextrine malt—by whatever name—is a great thing in many recipes!

—Editor

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BY GARY GLASS

Brewing in the Blue Ridge Mountains

When you think of homebrewing in the U.S. you immediately think of...North Carolina, right? Okay, well probably not, but maybe you should. North Carolina is currently home to five very active clubs—hopefully soon to be six with another recent start-up. One of those clubs is the Mountain Ale and Lager Tasters (MALT) of Ashville, NC. You have probably heard of MALT's most famous member, brewing scientist, author, and AHA lifetime member George Fix, but MALT is also the club that this year's AHA National Homebrew Competition Ninkasi Award winner, Brian Cole, hails from (George Fix won the Ninkasi Award in 1997).

MALT's home in Ashville, a community of fewer than 100,000 located in the heart of the Blue Ridge Mountains, sports a diverse population that runs the gamut from fundamentalist Christians to practitioners of witchcraft. This diversity seems to lend itself well to the hobby of homebrewing as Cole states that the club has received a warm reception from almost all of the restaurants and breweries that it has approached for meeting space. Cole also reports that Ashville has a great beer scene that includes two microbreweries and two brewpubs, which are all very supportive of the club. Ashville is also home to two homebrew supply shops. All things considered, it sounds like a great place to be a brewer!

Although the Mountain Ale and Lager Tasters is a young club with fewer than thirty dues paying members, don't be fooled, this club is a powerhouse of quality brewing. Since the club's beginnings in 1998, MALT members have racked up nearly 200 brewing awards (probably well over 200 by the time this issue hits your mail box). MALT's current president, Jay

Adams, was proclaimed North Carolina Homebrewer of the Year in 1999. In 2000, Brian Cole claimed that title and leads the race to retain it in 2001. MALT club members won eight ribbons in the Masters Championship of Amateur Brewing (MCAB) competitions in 2000 and 2001. MALT's National Homebrew Competition exploits include fourteen first round ribbons and four second round medals.

The club gained some major exposure in the local press this year when Brian Cole, a biologist for the U.S. Department of Fish and Wildlife, earned the 2001 Ninkasi Award as the winningest brewer in the National Homebrew Competition. Cole's hometown paper, the *Black Mountain News*, ran a front-page story on his success at the NHC and the *Ashville Citizen Times* featured Cole on the front page of its "Living" section. The press coverage led to a doubling of attendance at the next MALT meeting and will hopefully translate into additional long-term homebrewers and club members.

For the past three years, the Mountain Ale and Lager Tasters have put on their own competition, the Blue Ridge Brew Off, held in September. In its second year in 2000, the Blue Ridge Brew Off was already the largest competition in North Carolina with around 150 entries. This year the competition was a Qualifier for the Mid-South

Homebrewer of the Year award and drew a whopping 281 entries—not bad for a club with fewer than thirty members!

Perhaps you are thinking that this must just be a club full of ringers, but MALT supports club members representing all levels of brewing from beginning homebrewers to commercial brewers. Club brew sessions include both extract brews and all-grain brews.

Next time you are pondering the great states of homebrewing don't leave out North Carolina! For more information on the Mountain Ale and Lager Tasters or the Blue Ridge Brew Off, check out the club website at <http://caveartstudios.com/malt/>.

"Soul of Wit" Competition

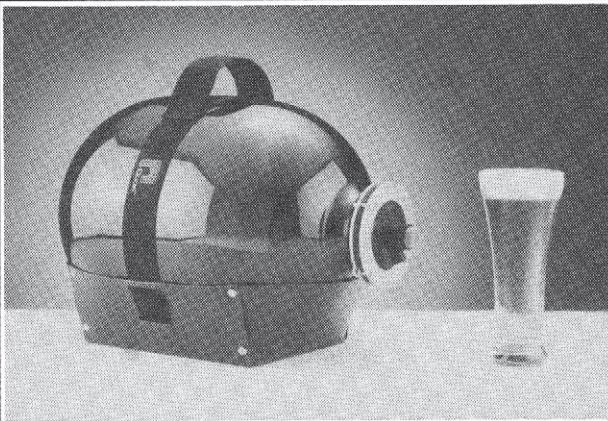
The AHA thanks Brian Freeman and the Gold Country Brewers of Sacramento, CA for hosting the "Soul of Wit" Belgian Wit Club-Only Competition held August 18, 2001. This was the first of six competitions in the August to May 2001-2002 cycle, with

Homebrew Club of the Year Standings

| Points | Club |
|--------|--------------------------------|
| 6 | Foam on the Range |
| 3 | Prairie Homebrewing Companions |
| 1 | ZZ Hops |

2001-2002 AHA Club-Only Competitions Styles

| Month | Style or Name | Cat.# | Host |
|----------|--------------------|--------|---|
| December | Mild Ale | 10A | Brewers United for Real Potables |
| Jan/Feb | Scottish Ales | 5 | Quality Ale and Fermentation Fraternity |
| March | Porter | 15 | New York City Homebrewers Guild |
| May | India Pale Ale | 7 | Gasconade Brewing Society |
| August | American Lager | 1 | Beer Unlimited Zany Zymurgists |
| Sept/Oct | Strong Belgian Ale | 18 | Minnesota Homebrewers Association |
| Nov/Dec | Fruits & Veggies | 21, 22 | Dukes of Ale |



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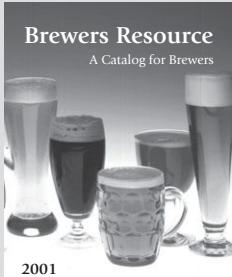
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Mild AHA Club-Only Competition

The December AHA Club-Only Competition is Mild Ale. The competition is hosted by Alison Skeel and the Brewers United for Real Potables.

The style for the competition is Mild Ale, Category 10A. One entry of two bottles is accepted per AHA registered homebrew club. Entries require a \$5 check made out to AHA and an entry/recipe form and bottle i.d. forms. More information on the club-only competitions and forms are available at: www.beertown.org/AHA/Clubs/clubcomp.htm.

Please send your entry to:

AHA COC
C/O Alison Skeel
3911 Spruell Drive
Kensington, MD 20895

Entries are due by November 29, 2001. Judging is slated for December 7, 2001. Email for questions is skeel@burp.org.

points going toward the Homebrew Club of the Year trophy. Points are awarded on a six-three-one basis for the club-only competitions and the first and second rounds of the AHA National Homebrew Competition. The club whose members have amassed the most points over the year is crowned the Homebrew Club of the Year.

Thanks to all of the club representative brewers who entered. There were 30 entries in the AHA "Soul of Wit" Club-Only Competition.

Congratulations to the following winners:

1st Place:

Brian Sherry of Aurora, CO representing Foam on the Range with "Nothing Too Wit."

2nd Place:

Vince Rokke of Fargo, ND representing the Prairie Homebrewing Companions with "Wit One."

3rd Place:

Mike Hahn of Salt Lake City, UT representing the Zion Zymurgist Homebrew OPeratives Society (ZZ HOPS) with "Belgian Wit."

Gary Glass is the Membership Coordinator for the American Homebrewers Association. When he isn't homebrewing he can be found working on his Masters Thesis in U.S. History. ☺

CALENDAR

AMERICAN HOMEBREWERS ASSOCIATION

OCTOBER

- 20** The 18th Annual Dixie Cup - LaCopa Dixie!, **AHA SCP**, Houston, TX. Speakers: Ray Daniels, Chris White, and Fred Eckhardt. MCAB Qualifying Event, 40 medal categories, including Mead and Cider. Contact: Jimmy Paige, 713-668-9440, 713-603-2512, hop5@gateway.net, www.crunchyfrog.net/dixiecup/.
- 21** Schleswig Wine & Bier Contest, **AHA SCP**, Schleswig, IA. 26th annual contest - beer since 1991, sponsored by Schleswig Wine & Bier Club. Open to amateurs, held at the Country Club. Expecting to have 90-120 entrants, so don't delay send your entries now! Fee: Pre-register, \$5.00 - Day of, \$6.00. Contact: Don Thompson, 712-676-3949 home - 712-364-3347 work, tommylee@pionet.net.
- 26** AHA On the Road - Southeast, Nashville, TN. Paul Gatzka with Special Guest - David Miller. Contact: Kate Porter, 303.447.0816 ext 123, kate@aob.org, www.beertown.org.
- 27** 6th Annual Music City Brewers Brew-Off, **AHA SCP**, Nashville, TN. Deadline: 9/28-10/12 Fee: \$6, Contact: Steve Scoville, 615-460-4626, scovillesp@aol.com , www.musiccitybrewers.com.
- 27** ASH Octoberfest, **AHA SCP**, Tempe, AZ. Sponsored by the Arizona Society of Homebrewers, live music will set the atmosphere for an exhibition of the best brews from club members and local (and some not-so-local) breweries. Contact: Matthew Martin, 480-775-2660, matt.martin@ieee.org, www.azbrewers.com.

- 27** Brewer's Dozen - TRUB XIII, **AHA SCP**, Raleigh, NC. Sponsored by Triangle's Unabashed homeBrewers (TRUB). Deadline: 10/6-10/25, Fee: \$5 1st entry, \$4 for each add. entry. Contact: John McElver, 916-620-9856, jmcclen@aol.com, www.hbd.org/trub/.

NOVEMBER

- 3** Teach A Friend To Homebrew Day. Once again the AHA is sponsoring Teach A Friend To Homebrew Day to encourage homebrewers everywhere to introduce our great hobby to friends and family who are not yet acquainted with homebrewing. Details will be posted on beertown and in *Zymurgy* as we approach the event. Contact: Paul Gatzka, 303-447-0816 x 122, paulg@aob.org, www.beertown.org/AHA/index.htm.
- 3** Novembeerfest, **AHA SCP**, Kent, WA. The Brews Brothers bring you the oldest and most respected homebrew competition in the Pacific Northwest. Deadline: 9/24-10/28 Fee: \$5. Contact: Rick Star, 425-681-5644, 253-773-0956, we_stars@msn.com, <http://www.brewsbrothers.org>.
- 17** Strong Ale Homebrew Competition, **AHA SCP**, San Diego, CA. Deadline: 10/29-11/9, Fee: \$6, Contact: Antoinette Hodges, 760-419-1204 work, 760-591-0088 info, ahodges@cts.com, www.softbrew.com\SAHC.
- 18** Great Brews of America 6th Annual AHA Sanctioned Homebrew Competition, **AHA SCP**, Lake Harmony, PA. This homebrew competition is a part of the 10th Annual Great Brews of America Classic Beer Festival. Deadline: 9/1-11/15, Fee: \$5, Contact: Shelly Kalins, 570-722-9111 ext 815, spevents@ptd.net, www.splitrockresort.com.

DECEMBER

- 1** The Hoppiest Show on Earth, **AHA SCP**, Lambertville, NJ. Open to homebrewers throughout the world! Deadline: 11/28, Contact: Judy Cox & Dave Albert, 732-452-4965, 609-252-1800, jud.m.cox@edwon.k12.nj.us, <http://www.Paleales.org>.

AMERICAN HOMEBREWERS ASSOCIATION

• KUDOS • SANCTIONED COMPETITION PROGRAM BEST OF SHOW

SEPTEMBER 2000

Tulare County Fair Homebrew Contest
Phil Routon of Tulare, CA.

JUNE 2001

7th Boneyard Brew-Off, 140 entries
Rick Georgette of West Bloomfield, MI.
Elliottville Triple Threat, 53 entries
Keith Curtachio of Buffalo, NY.

JULY 2001

Stanislaus Hoppy Cappers Summer Cap-Off 2001, 64 entries
Jamil Zainasheff of Elk Grove, CA.
Oregon State Fair Beer Competition, 168 entries
Mark Norbury of Salem, OR.
Amador County Fair, 99 entries
Jamil Zainasheff of Elk Grove, CA.
Ohio State Fair Homebrew Competition, 142 entries
Mark Richards of Columbus, OH.

AUGUST 2001

Buckeye Brewer of the Year, 33 entries
Jim Artman of Ashtabula, OH.
Benton - Franklin County Fair, 21 entries
Wayne Robertson of Richland, WA.
Alaska State Fair, 125 entries
Breck Tostevin and **Don Naff** of Anchorage, AK.

- 9-16** AHA Club-Only Mild Competition, **AHA SCP**, Kensington, MD. Hosted by Brewers United for Real Potables BURP. Deadline: 11/29-12/7, Fee: \$5, Contact: Alison Skeel, skeel@burp.org, www.beertown.org/AHA/Clubs/clubcomp.htm.
- 26** Meadllennium V, **AHA SCP**, Orlando, FL. Experience one of the few Mead-Only competitions held in the USA. This well established competition features beautiful Medal awards, for all eight BJCP Mead subcategories, and a special glass for each first place. Deadline: 1/4-1/22/02, Contact: Ron Bach, 407-262-7422 x 105 work, 407-696-2738 home, bachian@juno.com, www.CFHB.org.

JANUARY

- 19** 7th Annual Big Bend Brew-Off, **AHA SCP**, Tallahassee, FL. This one-day competition is for all categories of beer, mead and cider. The event is held at the Buckhead Brewery & Grill. Deadline: 12/31-1/12, Fee: \$6.00, Contact: Peter Pellemans, 850-425-1048 info, peter@pellemans.net, <http://www.nfbl.org>.

AHA SCP = American Homebrewers Association Sanctioned Competition Program. For a complete listing of events, see www.beertown.org. To list events, send information to *Zymurgy* Calendar of Events. To be listed in the January/February 2002 Issue (Vol. 25, No. 1), information should be received by November 13, 2002. Competition organizers wishing to apply for AHA Sanctioning must do so at least two months prior to the event. Contact Kate Porter at kate@aob.org; (303) 447-0816 ext. 1123; FAX (303) 447-2825; PO Box 1679, Boulder, CO 80306-1679.

Madison Homebrewers and Tasters Guild Test Munton's Extract

The rules for the Extract Experiment are simple. Each brewer (or group) makes a different style of beer. Malt extract must account for at least half of the total weight of the grain plus extract. The ingredients used must be readily available to all home brewers. At least one brewer should keep it simple, using very few additions to the extract.

All of the brewers for this version of the experiment are members of the Madison Homebrewers and Tasters Guild (MHTG) and live in the greater Madison, WI area. The Madison Homebrewers and Tasters Guild was founded in the early eighties by a small group of dedicated beer lovers and home brewers. In addition to hosting the annual Big and Huge home brewing competition, the MHTG has coordinated and hosted the Great Taste of the Midwest Beer Festival, the second longest running craft beer festival in the United States. The club website and information about the Great Taste of the Midwest can be found on the server of the Home Brewers Digest. Many of the brewers involved in this project are either members of the Beer Judge Certification Program (BJCP) or are studying to become certified beer judges.

The brewers for this experiment include: British beer lover Bruce Garner, veteran homebrewer Steve Klafka, MHTG past-president Fred Swanson, attorney and beer voyager John Barbian, brewer/webmaster Bill Rogers, big beer lover Mark Morrison, Bob "Hops" Paolino (what more need we say?) and Jeff Folgert who actually works in the USDA Barley and Malt Laboratory at the University of Wisconsin, Madison!

The Extract

The extract chosen was Munton's Extra Light Liquid Malt Extract. Six 1.5 kg cans



left to right: Steve Klafka, John Biggins, Colin Crowley, Mark Garthwaite, Bob "Hops" Paolino, Nathan Kanous, Bill Rogers (sitting), Mark Morrison (sitting)

of extract were donated by Munton's for this experiment. Munton's Extra Light Extract is extracted from the lightest available lager malt. Careful processing with the gentlest heating allows Munton's to produce the lightest possible extract from 100 percent malt.

Analysis of the extract (as found on the can) reveals a color of 4 to 7 EBU (2-3.5 SRM), no bitterness, 80 to 82 percent solids, a pH of 5 to 6 and 0.15 percent free amino nitrogen (FAN). These characteristics make this one of the lightest extracts available on the market and the most suitable for use in a wide variety of beers. More information about their products can be found on the Internet at www.muntons.com

The Beers

As expected, a variety of beer styles were selected for this effort. The first style

of beer selected was an English mild. This style was selected in an attempt to display the malty characteristics of this English malt extract. Other entries included a golden ale, a porter, an English pale ale, a brown ale, and an abbey ale. Recipes and the procedures used in making each of the beers are provided here.

Nathan's English Mild

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

- 3.3 lb Munton and Fison's extra light liquid malt extract (1.5 kg)
- 1.25 lb Briess golden liquid malt extract (0.57 kg)
- 0.5 lb 60° L caramel malt (0.23 kg)
- 0.5 lb 25° L caramel malt (0.23 kg)
- 3 oz Briess 260° L chocolate malt (85 g)
- 0.5 oz Amarillo whole hops 8.1%

I've learned that with good techniques and fresh, high-quality ingredients, extract brewers can easily and handily compete with even the best of all-grain brewers.

alpha acid (14 g) (60 min)
0.3 oz East Kent Goldings pellet hops
6.6% alpha acid (10 g) (15 min)
Wyeast No. 1338 European ale yeast
Forced CO₂ to carbonate
• Original specific gravity: 1.034
• Final specific gravity: 1.006
• Boiling time: 75 minutes
• Primary fermentation: 2 weeks at 66° F (19° C) in glass

Brewer's Specifics

Steep grains at 150° F for 30 minutes in two quarts water and squeeze/strain. Add this infusion to five gallons of hot water. Dissolve malt extract, bring to a boil and add hops according to the above schedule.

Judges Comments

This beer was light brown, with a very slight head and a definite haze. One panelist said that it looked like a glass of iced tea (without the ice or lemon). The aroma was lightly sweet and bready with a slight caramel note. The flavor was described similarly with a very light body and an acidic, dry finish. The low gravity and light body of this beer left many describing this as a great session beer.

Bruce Garner's Golden Ale

Ingredients for 5 U.S. gal (19 L)
3.3 lb Munton and Fison's extra light liquid malt extract (1.5 kg)
3.3 lb Briess golden liquid malt extract (1.5 kg)
1 lb dextrin malt (0.45 kg)
1.5 oz homegrown Cascade whole hops (unknown alpha acid) (43 g) (60 min)
0.5 oz homegrown Cascade whole

hops (unknown alpha acid) (14 g) (2 min)
1 oz homegrown Cascade whole hops (unknown alpha acid) (28 g) (dry)
1 pkg Lallemand Nottingham dry yeast, rehydrated according to package
Forced CO₂ to carbonate
• Original specific gravity: 1.047
• Final specific gravity: 1.008
• Boiling time: 60 minutes
• Primary fermentation: 1 week at 66° F (19° C) in stainless.

Brewers Specifics

Steep grains in five gallons water at 160° F (70° C) for 30 minutes and strain. Dissolve malt extract, bring to a boil and add hops according to the above schedule.

Judge's Comments

This beer seemed a bit young with a bit of yeastiness combined with moderate citrus hop aroma and a mild malty sweetness. The color was a deep gold with a slight haze. The flavor was well balanced between the malt and citrusy hops but with low bitterness. Smooth and easy drinking, this beer fell short of meeting all the criteria to be called an American pale ale but had much more hop presence than would be anticipated in a golden ale.

Fred and John's English Pale Ale

Ingredients for 5 U.S. Gal (21 L)

3.3 lb Munton and Fison's extra light liquid malt extract (1.5 kg)

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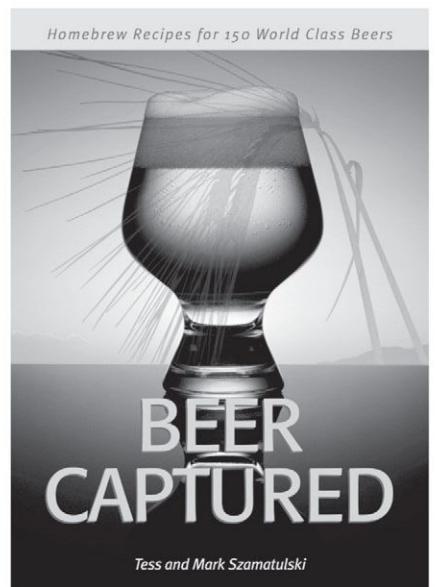
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3.3 lb Briess golden liquid malt extract (1.5 kg)
 1 lb 40° L crystal malt (0.48 kg)
 1.5 oz East Kent Goldings hops, 5% alpha acid (42 g) (45 min)
 0.5 oz East Kent Goldings hops, 5% alpha acid (14 g) (0 min)
 Wyeast No. 1098 English ale yeast
 0.75 cup dextrose (177 ml) (to prime)

- Original specific gravity: 1.045
- Final specific gravity: 1.008
- Boiling time: 60 minutes

- Primary fermentation: 1 week at 70° F (21° C) in glass.

Brewer Specifics

Steep grains at 160° F (70° C) for 30 minutes and strain. Dissolve malt extract, bring to a boil and add hops according to the above schedule.

Judge's Comments

A distinct vegetal aroma was apparent in this beer with notes of yeastiness and wort. Little hop aroma was detected. Visu-

al inspection revealed a deep amber color with lots of yeast in suspension and good head retention. The flavor left a bit to be desired with medium to high bitterness, some vegetal notes, a bit of worty sweetness, and low hop flavor. Although smooth and buttery on the palate, this seemed to be a mild interpretation of the style with some faults that may improve if allowed to clear. A little better sanitation and more finishing hops would help this beer.

Steve's Porter

Ingredients for 5.25 U.S. gal (20 L)

3.3 lb Munton and Fison's extra light liquid malt extract (1.5 kg)
 3.3 lb Briess golden liquid malt extract (1.5 kg)
 1.5 lb 25° L caramel malt (0.7 kg)
 1 lb chocolate malt (0.45 kg)
 0.5 lb Special B malt (0.23 kg)
 1 oz Santiam hops 6.8% alpha acid (28 g) (60min)
 1 oz Santiam hops 6.8% alpha acid (28 g) (30 min)
 1 oz Liberty hops (dry)
 Wyeast No. 1056 American ale yeast
 Forced CO₂ to carbonate

- Original specific gravity: 1.052
- Final specific gravity: 1.012
- Boiling time: 60 minutes
- Primary fermentation: 3 days at 70° F (21° C) in glass.
- Secondary fermentation: 11 days at 40° F (4° C) in glass



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Brewer Specifics

Steep grains at 160° F (70° C) for 30 minutes and strain. Dissolve malt extract, bring to a boil and add hops according to the above schedule.

Judge's Comments

This dark brown/garnet ale with creamy light brown head greeted the tasters with a very roasty, chocolatey, molasses-tinged aroma. The flavor of this beer was dominated by roasted malt and chocolate flavors with a bit of sweet malt for balance. Overall, a medium bodied beer with a bit of roasted malt astringency and a touch of

sweet finish. Cut back just a bit on the roasted malts and you've got a contender here!

Bill and Mark's Abbey Ale

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

- 3.3 lb Munton and Fison's extra light liquid malt extract (1.5 kg)
- 3.3 lb Briess golden liquid malt extract (1.5 kg)
- 1 lb Northwestern gold malt extract (0.45 kg)
- 3 lb Munich malt (1.36 kg)
- 4 oz 120° L crystal malt (110 g)
- 1 lb dark Belgian candy sugar (0.45 kg)
- 1.5 oz Perle pellet hops (42 g) (60 min)
- 0.5 oz East Kent Golden pellet hops (14 g) (15 min)
- 0.5 oz Czech Saaz pellet hops 3.2% alpha acid (14 g) (dry)
- Wyeast No. 1214 Belgian Abbey ale yeast
- 1 cup (236 mL) corn sugar for priming

- Original specific gravity: 1.081
- Final specific gravity: 1.012
- Boiling time: 90 minutes
- Primary fermentation: 1 week at 64° F (18° C) in glass
- Secondary fermentation: 3 weeks at 64° F (18° C) in glass

Brewers Specifics

Mash grains in four quarts of water at 152° F (67° C) for 1.25 hours. Mash out at 170° F (77° C). Sparge with two gallons water.

Judges Comments

A deep copper/brown ale emerged from the bottle and proceeded to lift a beautiful tan head to the rim of the tasting glass. This beer had that characteristic sweet, fruity malt aroma you'd expect to find in a classic Belgian ale! Plenty to go around with a touch of banana and clove to boot. The full body, creamy mouthfeel and gentle dry finish made this the beer to beat in this tasting. Overall, the only shortcoming of this beer was its age. With such a high starting gravity it should just be coming into its own during the cold Wisconsin winter. As one judge described it "warms you right to your toes."

Jeff and Bob's Brown Ale

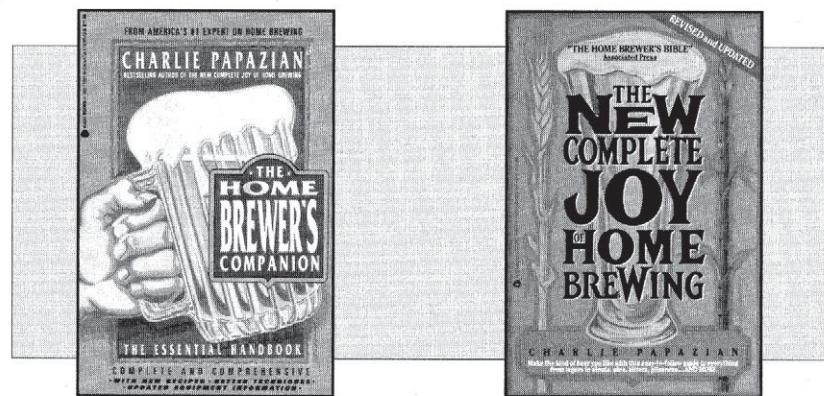
Ingredients for 5 U.S. Gal (19 L)

- 3.3 lb Munton and Fison's extra light liquid malt extract (1.5 kg)
- 3.3 lb Briess golden liquid malt extract (1.5 kg)
- 11 oz 375° L Belgian chocolate malt (312 g)
- 11.5 oz 90° L Hugh Baird dark crystal malt (326 g)

- 8 oz 60° L caramel malt (227 g)
- 4 oz 10° L Hugh Baird caramel malt (113 g)
- 0.5 oz Irish seedless Northdown whole hops, 9.7% alpha acid (14 g) (60 min)
- 0.5 oz Target whole hops 10.7% alpha acid (14 g) (45 min)
- 1 oz Challenger hops (plug) 7.10% alpha acid (28 g) (30 min)
- 1 oz East Kent Goldings pellet hops

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4.5% alpha acid (28 g) (15 min)
1 oz East Kent Goldings pellet hops
4.5% alpha acid (28 g) (steep)
Wyeast No. 1056 American ale yeast

- Original specific gravity: 1.055
- Final specific gravity: 1.012
- Boiling time: 60 minutes
- Primary fermentation: 3 days at 70° F (21° C) in glass
- Secondary fermentation: 11 days at 40° (4° C) in glass

Brewers Specifics

All grains were processed in a food processor. The husks were separated from the "goods". Final weight of the "goods" was 29 oz (822 g) added to the boil kettle with the malt extract.

Judge's Comments

As a fairly straightforward brown ale, this medium brown ale carried a nice caramel aroma with just a touch of hops.

Brewing myths have come and gone and some remain despite the fact that many brewers disprove them every day. Such is the case with home brewing from extract.

While a bit hazy, this beer had a balanced fruity caramel malt flavor with a distinctly bitter finish. With a fairly light body and dry finish, this seemed to be a restrained representation of the style. Overall this was a very clean, drinkable beer if not just a slight bit too bitter.

Conclusion

Overall, this extract performed quite well in brewing a variety of styles of beer. Although there were slight differences in how some of the judges described the sensations they encountered while tasting these beers, the



evaluations were relatively consistent throughout the group.

In addition, the higher gravity beers were consistently rated as having a more prominent malt aroma compared to the lighter styles. This only makes sense and, as described above, even the English mild with an original gravity of 1.034 maintained an appropriate level of maltiness for the style.

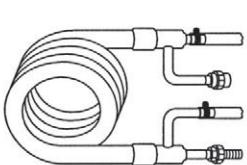
Brewing myths have come and gone and some remain despite the fact that many brewers disprove them every day. Such is the case with home brewing from extract. I've learned that with good techniques and fresh, high-quality ingredients, extract brewers can easily and handily compete with even the best of all-grain brewers. Munton's extra light liquid malt extract is a very versatile product that is well suited for brewing a variety of beer styles.

Nathan Kanous has been brewing beer since November, 1993. He brewed his first two beers from kits then quickly became involved in all-grain brewing. He has been a member of three different home brewing clubs and a member of the American Homebrewers Association. He has been studying to take the BJCP exam in the Fall of 2001.

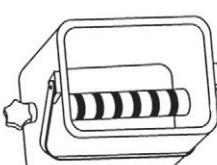
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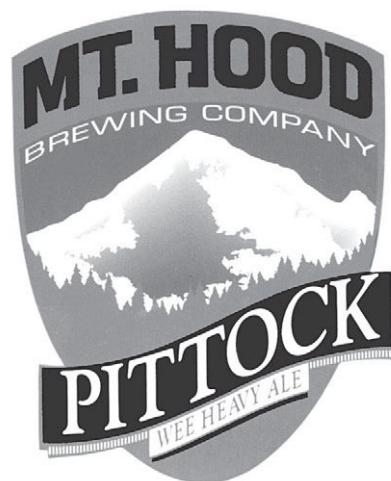
BY AMAHL TURCZYN

Mt. Hood Brewing's Pittock Wee Heavy Scotch Ale

Pittock Wee Heavy Scotch Ale was born as a strong seasonal ale in 1993. The name of the beer comes from Henry L. Pittock, who was the first man to reach the top of the 11,240 ft. Mt. Hood, Oregon in 1857. Mt. Hood Brewing Company's brewmaster Jon Gruber was inspired to brew a really big Scotch ale using a touch of peated malt and some slightly unorthodox brewing methods, but came up with a beer that has received lavish praise from beer icons Michael Jackson and Fred Eckhardt. It has remained one of his favorite beers ever since. Part of Gruber's inspiration came from the Classic Style Series book, *Scotch Ale*, where some of the history behind this rich and potent ale is explained. At one time, Scottish malt was all peat-smoked, as peat was the most available fuel for kilning. "Of course, today," Gruber commented, "Scottish brewers wouldn't be caught dead using it." But just a tiny amount, about one percent of the total grain bill, adds a smoky complexity to the beer without burying the malt and caramel flavors.

The grain bill calls for half domestic (Great Western) and half imported (Hugh Baird) two row malt. There is also Munich, lots of caramel malt, rolled oats, and Hugh Baird medium-peated malt. And at 1.085 original gravity, this is a hefty mash-in. The brewery's mash tun is basically filled to the brim to make the Wee Heavy. "It's a miserable sparge," Gruber admits. "It's as big a beer as I can make on this system. We actually do make a bigger beer, a barleywine, but we do a double mash for that one."

Gruber also uses a few other tricks to get the proper flavor, color and aroma. "We caramelize the first runnings in the kettle until they are almost scorched." This contributes to the beer's full, reddish-bronze color and deep malt flavor. For homebrewers, Gruber added, it would mean running 8 to 10 ounces of first wort into the kettle and



boiling it until its color darkens significantly. He warns, "You need to keep an eye on it, and be ready with the hose if looks like it's going too far." This is probably not necessary for extract brewers, although if some brave extract brewer wants to experiment with caramelizing straight malt extract syrup for this purpose, we'd love to hear about it!

Another technique Gruber uses is a high-temperature mash-in. "Mash high and thick," he recommends. Especially if you have limited mash tun space. Conversion at 158 to 159° F (70 to 71° C) assures plenty of dextrins and a full, rich mouthfeel. It also encourages a high finishing gravity (1.028) which is very important when you are trying to end up with an authentic Scotch ale. Again, extract brewers needn't get their kilts in a wad—using a high-quality malt extract syrup should result in an appropriately full-bodied beer.

Hops play a minor role in this beer. Gruber uses Mt. Hood (of course!) or Vanguard for the boiling hops, which serve little more than to add a bit of anti-bacterial presence. IBUs for the beer are in the teens. Gruber does add just a bit of Willamette and

E. Kent Golding hops for a touch of hop aroma, though.

Yeast is another important component to this style. With Wyeast right down the road, it is Mt. Hood Brewing's yeast of choice, and they use the Special ESB Ale No. 1968 strain for their Scotch ale. Gruber ferments this beer in the Scotch ale tradition, very cool (58 to 60° F, or 14 to 16° C), but says that the ESB strain doesn't have a problem with this. He does mention that it is very important to oxygenate the wort thoroughly before pitching, to help the yeast attack such a potent wort. Also to that end, the beer is double pitched, with twice the amount of yeast slurry normally used, to make sure it can get the job done. When the gravity of the fermenting beer reaches 1.028, the beer is crash-cooled from 60° F down to 50° F (10° C) to prevent too dry a brew. Gruber says the yeast is pretty worn out by that point anyway, and usually falls out rapidly. Obviously, it is not re-pitched afterwards.

After the beer has been crash cooled, it undergoes a period of "lagering" for six weeks at 40° F (4° C) to smooth out any edges. Then it is ready to serve! And it's not just the brewer's favorite—Gruber normally only has to brew Pittock once a year, but last year he had to make two batches to keep up with demand. So if you're ever in Portland, look around for the biggest mountain you can see (that would be Mt. Hood) and pay Jon a visit. Also, in case you have any questions about brewing Pittock, Jon Gruber was generous enough to provide his work e-mail: breweryinfo@mthoodbrewing.com. Visit the brewery's web page at www.mthoodbrewing.com.

While Gruber didn't specify proportions, the following is a guess at his Pittock Wee Heavy (see page 20).

Amahl Turczyn is the associate editor of Zymurgy magazine.

Pitcock Wee Heavy Scotch Ale (all grain)

Recipe for 5 gallons (19 L)

5 lb Great Western pale malt (3.18 kg)
 5 lb H. Baird pale malt (3.18 kg)
 2 lb 55°L crystal malt (0.91 kg)
 1.5 lb Munich malt (0.68 kg)
 1 lb rolled oats (0.45 kg)
 0.5 lb wheat malt (0.23 kg)
 2 oz peated malt (57 g)
 0.75 lb dark Belgian candi sugar (0.34 kg)
 0.5 oz Mt. Hood hops, 4% alpha acid (14 g)
 (90 min)
 0.5 oz Willamette hops, 5% alpha acid, (14 g)
 (10 minutes)
 1 oz E Kent Goldings hops, 4% alpha acid (28 g)
 (steep)
 Wyeast No. 1968 Special ESB ale yeast
 0.75 cup corn sugar (177 mL) to prime

Brewer's specifics: Mash grains at 158° (70° C) and hold for one hour. Sparge, dissolve sugar into wort and boil for a total of two hours. Remember to sparge a sufficient volume (6.5-7 gallons, or 24.6 to 26.5 L, depending on your rate of evaporation) so that you will end up with 5.5 gallons after the boil. Chill to 60° F (16° C) and pitch a very generous amount of fresh yeast slurry. Two weeks at 58 to 60° F (14-16° C) should be sufficient for primary fermentation. If the yeast looks like it is beginning to settle out prematurely, you can rouse it back into solution by swirling the carboy a bit. When final gravity is reached, the beer can be racked into a secondary container and conditioned at 40° F (4° C) (if possible) for four to six weeks. If bottling, add about a tablespoon of fresh yeast slurry to the cleared, conditioned beer along with the priming sugar, mix thoroughly, and bottle.

- Boiling time: 120 minutes
- Original gravity: 1.085
- Finishing gravity: 1.028

For an extract version, substitute 9.5 lb (4.3 kg) pale malt extract and 0.5 lb (0.23 kg) dry wheat malt extract for the malted grains (except the peated malt), and omit the oats. Steep the crushed specialty malts and peated malt at 150° F (66° C) for 30 minutes, then remove them. Add extracts and candi sugar and proceed with a 90 min boil, chill and ferment as above.

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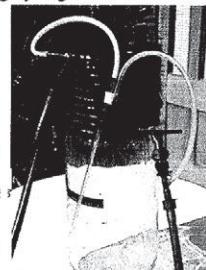
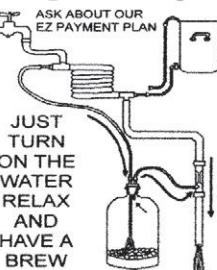


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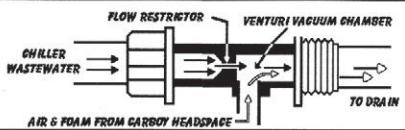
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Hop Types

Dear Professor,

I was given two hop plants a few years back. The person who gave them to me wasn't sure what variety of hops they were. The plants have done well and every year there is an abundance of hops. I have made several batches with them with great results.

What I want to know is, is there any way to find out exactly what variety the hops are? The two plant are definitely different—one has a much more floral aroma than the other. Like I said, I use them now for my brew, one as bittering, one as aroma, but it would be nice to know what they are.

Thanks,

Roger Musselman

Dear Roger,

Is there a way? Probably, but I can't personally help you here because that's not what I majored in. I bet if you were to go to Yakima Valley in Washington and talk to the hop merchants and farmers they could begin to give you a good idea. By looking at the size and shape of the leaves and cones you could narrow it down. Check out the 1990 Special Hop Issue of Zymurgy—on page 15 there's an article by Alfred Haunold called "Development of Hop Varieties" that includes photos of the leaves of 12 common hop varieties. Each of these is fairly distinct from the others...your hop plants might match up. (If you don't have that issue, you can always call us at (888) U CAN BREW and order it.) Or, the flavor and aroma could tell you something. Perhaps even the behavior of how it grows, how fast it grows, its color. Some hops are more distinct than others; such as Cascade or its hybrid cousins. If all else fails, bring them to an American Homebrewers Association conference sometime or even your local homebrew club and you may find an expert that can help out. I'm sure we'll want to try your beer too.

*Just hopped out for a minute,
The Professor, Hb.D.*

ILLUSTRATION BY JOHN MARTIN

Referrals from Michael Jackson

For this issue, famed beer writer Michael Jackson forwarded two homebrew questions from his fans to the Professor.

Mixing Yeasts

Dear Mr. Jackson:

I enjoy your work and am beginning to look to your writings as the Word. Could you suggest a thorough book on yeasts? I enjoy mixing yeasts and beer styles in my brew to find new flavors. However, inexperienced as I am, I would appreciate any guidance you may be able to offer. Thank you.

R. Scott Strahan

Cookeville, TN

Dear Scott,

More and more homebrewers are mixing yeasts. Essentially the thinking seems to be that mixing yeasts will add complexity to the

beer's flavor. There's not a lot of technical information about exactly what you will get by doing so, but it is safe to say some of the classic traditional European beer brands, I would say, used to have a complex and enjoyable character... Many of these breweries have "cleaned up" and now use single strains and I think as a result have lost the characters I use to enjoy. I say do it! I don't want "clean" beer. I want good tasting beer.

Mix lager yeasts with lager yeasts and ale yeasts with ale yeasts. You may wish to experiment by mixing ale with lager yeasts, but know that ale yeast activity diminishes below 60° F (16° C).

*Bring back traditional taste,
The Professor, Hb.D.*

Not a fatal attraction

Hello Michael,

A question, if you could spare a few moments. I have recently re-started home brewing after an absence of around a decade. At that time I was bottling into dark brown bottles. This time around I have clear bottles. I am noticing that there appears to be a very thin layer of tiny white "granules" stuck to the sides of the bottles about half way up. When the bottles are tipped on their side, the beer washes these away and into the liquid leaving them to float in suspension. The bottles do have a thin layer of white sediment on the bottom as well, but am I right in assuming that these tiny white granules are yeast which is working out the sugar placed into the bottles for carbonation? Why would they stick to the side of the bottle? (Albeit in a very thin and sparse layer). When the sugar is worked out, i.e. when carbonation is finished (after approximately two weeks), is it usual for this yeast to fall to the bottom of the bottle again or should I take steps to swirl each bottle and "rinse" it off the inside at the completion of carbonation, and allow the bottles to sit again



for a few days to clear up and in this way removing the yeast from the side of the bottles to get a more yeast-free drink? (I assume this is yeast and I am hoping that it is not some form of visible infection). Would this have always occurred in the past, and I haven't seen it before given that now I am using clear bottles?

Thanks for you thoughts,
Kind regards,
Martin Lobert.
nitram1@iinet.net.au

Dear Martin,

You are correct. That is yeast sticking to the sides of the bottle. It happens to me in mysterious ways as well. Swirling will easily dislodge the yeast and it will settle out. I have found that often it is only one side of the bottle that the yeast sticks to. Temperature difference? Static electricity? I don't know. But it does no harm and a little yeast is very healthy, especially if you enjoy too much homebrew on occasion.

It happens on all manner of bottles, but not always. Some yeasts are more flocculent, others are powdery and perhaps more susceptible to the magnetic attractions of electricity or temperature difference. I'm just supposing and enjoying the beer anyway.

Good observation.
The Professor, Hb.D.

Chew gum, not beer.

Dear Professor:

I have heard some people refer to certain beers as 'chewy'. Do you have any idea what they mean by this?

Thanks.

Bob Klaput
Ford City, PA

Dear Bob,

In all my born days I've never been stumped, but you know I don't know whether I can answer this. I'm guilty too. I've used the term chewy to describe the character of beer but never thought about it. Perhaps I'm referring to a hybrid of the feeling of having a full-bodied beer along with a lingering sensation in the mouth feel that inspires smacking your tongue and lips. Perhaps I'm referring to a sensation of graininess that continues to linger in the aftertaste. But a definitive answer? I don't know.

Maybe it's time to retire? I feel depressed and insecure now having failed to describe "chewy". Wasn't he a character out of Star Wars?

The Professor, Hb.D.

Passing Gas

Dear Professor,

I have a home brewing system which I had for almost 10 years and to this point it has operated for me error free. Within the last couple of months I have been getting only about 1.5 weeks out of my CO₂ tank. At first I thought that my local dealer was giving me tanks that were almost empty but now I realize that I have a problem. I used to get around 3-4 quarter kegs per CO₂ bottle. Can you help me out and let me know what you think the problem could be? I do not think that I have a leak. The hoses appear to be in good condition. Could it be a faulty regulator?

Thank you in advance for all your help.
Edward P. Wintergrass

Dear Edward,

There could be a number of possibilities as to why you're not getting your money's worth. But the easiest way to figure out what's going on is to simply spray down your setup with soapy water. Make sure to hit all the hose fittings and regulator connections, the main shut-off valve on the tank and your keg connectors, but try not to spray water directly into the gauges themselves. See any bubbles forming? If there are any leaks, they should show up.

By the way, I never leave my gas on when not attending to a pour. The gas gets turned on ONLY when the dispensing pressure and stream of beer slows down. That way, if there is a leak somewhere I won't lose the entire bottle of CO₂ overnight. Besides, it's dangerous if you have a leak and there's a gas pilot light for a water or house heater nearby—the CO₂ may snuff out the pilot light and if you don't have a modern safe system, that could be dangerous.

When you find where the leak is, you can figure out who and where to go to in order to fix it.

Not passing gas,
The Professor, Hb.D.

Send your homebrewing questions to "Dear Professor," PO Box 1679, Boulder, CO 80306-1679; FAX (303) 447-2825 or professor@aob.org

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Pacific Direct, a Seattle area company, has introduced a line of beer openers that actually talk. There are no buttons to push; the sound is automatic when the opener touches the cap. The original talking beer opener, designed for the country's sixty-five million beer drinkers, features a happy voice saying, "Oh yeah! Time for a beer!" Due to the overwhelming response to the original, more licensed talking beer openers have recently been added. The Corona version, backed by lively music, features a woman saying, "Cerveza, señor?" followed by an enthusiastic, "Oh Corona!" The Miller version says, "Oh, it's Miller time!" as a beer is being poured. The Three Stooges talking beer opener features Curly ordering a beer, and, as the beer is being poured his trademark "N'yuk n'yuk, n'yuk" and "Woo-woo-woo" can be heard. The talking beer openers are being marketed by sales reps to retailers nationwide, through radio and TV ads, online at talkingbeeropener.com or by calling (800) 535-0131. Suggested retail price is \$7.95.



Italians Drinking More Beer

Italian beer industry association Assobirra has announced that in the year 2000 Italian beer drinkers aged fifteen and over made up 63.9 percent of the population—an increase of 2.5 percent over the 1999 statistic. Annual per capita beer consumption increased to more than 28



liters, up from 27 liters in 1999. (By comparison, German drinkers, who have been drinking less beer in recent years, still consumed a respectable 125 liters per person in 2000.) Italian domestic production rose three percent to 14.96 million hectoliters (9.9 million barrels) while microbreweries are becoming increasingly popular and successful. About 90 percent of Italians prefer pale lager beer; bottles are clearly preferred to cans; and the growth rate of beer consumption seems to be among working women between the ages of 35 and 50. Beer is said to have even become a kind of status symbol for higher-level working women. In 1999, Assobirra reported that annual per capita beer consumption for women was 10.1 liters—they expect that this consumption will rise to 12.1 liters by 2004.

Could Wine Drinkers Be Smarter Than Beer Drinkers?

A recent study published in the Archives of *Internal Medicine* suggests wine drinkers could not only be smarter than beer drinkers, on average, but also better adjusted. The study, which was intended to show the apparent health benefits of drinking wine, was based on data from the *Copenhagen City Heart Study*, which began tracking changes in health after Denmark joined the European Union in 1973. The Danes were originally a beer-drinking culture, but slowly moved to drinking mostly wine over a period of about 25 years. The study observes behavioral differences between the wine and beer drinker of that



culture in the 1990s. Wine drinkers repeatedly outscored beer drinkers on tests designed to measure personality function, psychiatric symptoms and health-related behavior. They also showed fewer neurotic tendencies, and less inclination towards anxiety, alcohol abuse and smoking. IQ scores were also higher in the wine drinking segment of the population: wine drinking males averaged 113.2, while beer drinking males averaged 95.2. As to health benefits, the study was in agreement with the French Paradox, that red wine contains compounds which lower the blood's tendency to clot and raise beneficial cholesterol levels. There is some disagreement, however, as to the question of where these health benefits actually come from—the ingredients in the wine itself, or the elevated social and financial status, and higher IQ. Because of the strong relationship known to exist between intelligence, social status, and psychological well-being, the researchers concluded, the medical benefits associated with wine drinking "are not likely due to the direct physiological effects of the beverage itself."

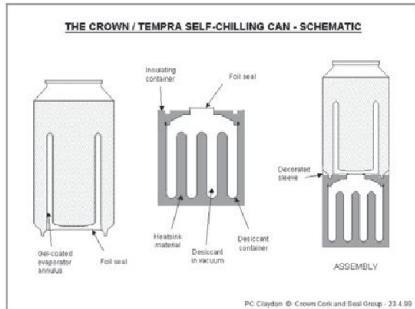
Another Ice Beer On The Map

Fischer Beverages of Alsace, France has released a beer named 63° N, 46° W. The coordinates indicate the location of the source of water used to brew the beer, namely ice from glaciers in Greenland. These glaciers are supposedly thousands of meters below the surface, and may be up to 250,000 years old. The ice is therefore pollution-free, backing up the brewery's claim that this is the world's purest beer. Janet Lamberton, a



pioneer in sub-glacial exploration, was hired by Fischer to search for and collect the best possible ice blocks in the Greenland glaciers. The ice was then shipped in solid form to the brewery in France where it was then melted and made into beer. All this purity doesn't come cheap, though...three 33cl bottles sell for a whopping \$49.95 through their website at www.fischerbeverages.com.

A Self-Chilling Can



A Florida company and Crown Cork and Seal have jointly produced a self-chilling beverage can. The can works on vacuum heat pump technology, much like a refrigerator. The desiccant in the vacuum draws heat from the beverage through an evaporator into an insulated heat container attached to the bottom of the can. The process will cool the beer 30 degrees Fahrenheit in three minutes. Initially, a 16 oz self-chill can with 11 ounces of beverage will sell for about \$1.50 a can. Critics feel the premium price and the wide availability of chilled drinks will limit the potential of Tempra Technology's invention.

The Million Dollar Fish

In one of the most unusual promotions this year, mega-brewer Anheuser-Busch tagged 30 individual fish and placed them in 30 different bodies of water during the month of July. Each of these fish was worth a \$1,000 prize if caught. One of the fish, called "Jake" was to fetch a one million dollar prize.

"The 'Catch Big Jake' promotion is yet another means we can encourage con-

sumers to enjoy the outdoors while educating the importance of conserving our natural resources," said Keith Levy, director, Tactical Brands, Anheuser-Busch, Inc. "One lucky angler will not only reel in a great catch, but may also have one great fish-tale to tell!"



"Fishermen and hunters were the first and are still the leading conservationists in the U.S. and Catch Big Jake is another indication of Anheuser-Busch's recognition of the important role they play," said Gary Guinn, director of Corporate Development at the National Fish and Wildlife Foundation.

Amahl Turczyn is the associate editor of Zymurgy magazine.

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Veteran Voice: An Outspoken View on

Hops



By Gerard W. Ch. Lemmens

From time to time, we have the opportunity to bring you first-person perspectives from veteran professional brewers. While the information often ventures beyond the scope of homebrewing itself, it illuminates our overall knowledge of beer and brewing. We hope you enjoy this latest installment.

- Editor

Since I have been in the hop industry for nearly 30 years, it may surprise you to know that my views on hop varieties and their classification have very much changed in the last seven years, since I have been working in the US hop industry. Although I'm not very familiar with the homebrewing world, I suspect that a lot of the myths and misperceptions about hops in the commercial brewing industry have filtered down to the homebrew scene as well. I'll try to disabuse you of some of those myths and let you in on some of the essential secrets about hops that many of your commercial brethren should know, but all too often do not.

Alpha and Aroma Varieties

These days, in my opinion, we should not talk about "alpha," "super alpha" and "aroma" varieties but just about hop varieties. Why? Because in the old days a clear distinction was made between "alpha" (or "high alpha" or "super alpha")

varieties which had an aroma which was disliked by brewers, especially ale brewers (they used to refer to it as cat piss). Since those days, "high" and "super alpha" varieties such as Horizon, Magnum, Simcoe and Warrior have been developed which all have very "good" (acceptable, interesting or extremely nice) aromas. So good are those aromas that some brewers have used them as single kettle addition and have produced brilliant beer with them. One only needs to mention Vinnie Cilurzo of Russian River who before the Anderson Valley Beer festival in April this year, had produced a pale ale with only Simcoe (alpha 12 to 14 percent), which was so good that all his fellow brewers raved about his beer and the sales of Simcoe shot up after the festival.

Another example is the popularity of Amarillo, a variety with eight to 10 percent alpha acid. This variety is also used as a single hop and seems to be doing well in many different beer styles, from barley wines (B.J.'s in Boulder, CO) to blonde (Snipes, Sunnyside, WA). Amarillo is the only variety which has an aroma slightly similar to Cascade—what I would describe as a rose petal aroma.

The U.S.A. now grows the most number of hop varieties and produces each year far more new varieties than any other hop producing country in the world. This is achieved by private breeding programs of the three largest American hop dealers (John I Haas, S. S. Steiner and Yakima Chief Inc.) and by the Hop Research Council (HRC).

Personally, I used to hate any variety with a "catty" (a more friendly expression than the term "cat piss") aroma, such as Brewers Gold, Bullion, Chinook, Tomahawk, Columbus and Galena. But I have learned here in the USA, that if used in small quantities and mixed with other varieties, they can actually contribute to an interesting final aroma in the beer. I think more English and European brewers are learning this too.

High Alpha Varieties

What is high, in your opinion, for an alpha acid in a hop? Many brewers would give very different answers to that question. If that question was asked 30 years ago, the answer would have been seven percent. In the late 1970s the answer would have been around 11 percent and now, what would the answer be? Maybe 16 percent?

In my opinion it does not matter how high the alpha acid content of a hop variety is, what matters is the aroma that you get from this variety—the aroma you want to get in your final beer. You can only find that out by using that variety as a single hop addition and then with your next brew, experiment adding some other varieties as late copper addition. If you are happy using it as a single hop variety that is even a bonus, because it simplifies your brewing.

One factor I do encourage you to look at is the cohumulone level. Cohumulone is one of the five alpha acids found in hops. And although there are some people in the brewing industry, such as Professor Michael Lewis of UC Davis, who would not necessarily agree with me, this is an important feature of hop character. Personally, I believe that when you are making a well-bittered beer (greater than 25 IBUs) cohumulone levels need to be low—in the range from 15 percent to about 25 percent. (Note: the cohumulone percentage tells what portion of the total alpha acid content is contributed by the alpha acid cohumulone.) The low end of this range is represented by the new variety Simcoe, while the upper end of this desirable range shows up in Magnum, a wonderful dual-purpose hop with a total alpha acid content of 12 to 15 percent. A high co-humulone proportion does not matter in beers with less than 25 IBUs of bitterness.

How Do You Describe Hop Aroma?

Aromas are so personal, that many people will describe them completely differently, hence I feel that I can not fulfill the request of writing a paper describing the aroma of each variety—that is impossible in my view. I hope you agree. However, later on I will mention some similarities between some varieties, and provide suggestions for substitution in case you run out of a specific variety, which with the coming world hop crop will be a possibility!

The Steady Supply of Hops

For the past seven years there has been an oversupply of hops worldwide. Thus both supplies and prices have been fairly favorable to brewers of all sizes. This situation



is changing already, and supplies are not so likely to be readily available. Since pellets and vacuum-packed leaf hops will keep well (especially in the freezer) for years, you need not have any worries about buying older crop products. Also, you can buy supplies and keep them in your freezer for a considerable time.

For the 2000 hop crop, there was a change in the spot market as production decreased. Last year some commercial brewers who had not contracted for their hop supplies found that they could not get certain varieties. This year, I think there will be more shortages across more varieties and in larger quantities.

The key issue on hop quality is the period and especially the temperature of storage in warehouses between harvest and the packaging of the hops. For the homebrewer, you must rely on the store and their selection of hops from a wholesaler. Those who purchase from major reputable wholesalers are likely to have the best product. Those who seek the cheapest possible source of hops are likely to be rewarded with hops of the poorest possible quality.

What Variety Can Be Replaced with What?

Well, here again, it is completely going to be someone's opinion and in this case it is mine. Luckily I am very opinionated, especially when it concerns hops! Hence I would advise you to ask yourself the following questions and then to make up your own mind. (For my suggested replacement of certain varieties, see Table 1.)

1. Should You Look at The Hop Parentage?

Certainly have a look at the parentage charts, many of which are originally from my hand. What are these charts going to tell you? They are certainly not always going to show you that closely related varieties can always be replaced. The genes are not only inherited from the mother but also from the father plant! Most higher alpha hops have in their parentage Brewers Gold, the first variety bred in 1909 by Prof. Salmon in Wye, Kent, England! Well, do all the higher alpha variety all smell the same and just like Brewers Gold? Definitely not! Think of your brothers and sisters—are you all the same and like your Mom and Dad?

However, there are some which are quite close, especially if they have been crossed in a certain way with a colchicine-induced tetraploid female—such as Mt. Hood, Liberty, Ultra, which are all half sisters—although their aroma and alpha might be very similar, their other technical data (especially cohumulone) could be significantly different!

2. Should You Look at the Alpha Acid Content?

Yes and No. Yes, because it would be easy to replace it in your hop grist with a hop that has a similar alpha acid content.

TABLE 1: Hop Varieties Substitutions and Interrelations

Ahtanum, Perle, Challenger

Ahtanum could possibly be replaced with Perle or with a 50/50 blend of Goldings and Challenger.

Cascade, Amarillo

Cascade could be replaced with Amarillo taking the difference in alpha acid into consideration to adjust the quantity.

Centennial

Centennial is a difficult variety for which to suggest a replacement. It is grown in extremely small quantities, hence supplies are very restricted. Probably a 50/50 mixture of East Kent Goldings and Brewers Gold might be the substitute to try.

Chinook, Galena, Tomahawk

These three varieties all seem to have a rather "catty" aroma, hence could be used as substitutes, taking into account differences in alpha acid content. Tomahawk is susceptible to powdery mildew and might be replaced in the future by another super alpha variety called Warrior, which has a very fine aroma that resembles a strong Willamette aroma.

Cluster

It is difficult to give a substitute for Cluster as there are two different root stocks grown for this variety. The nearest would be a blend of Fuggles and Galena.

Crystal, Mt. Hood, Liberty, Ultra, Vanguard, U.S. Hallertau Mittelfruh

Crystal, Liberty, Mt. Hood and Ultra are all half sister to each other and all bred from a Hallertau Mittelfruh breeding background. Together with Vanguard and the US Hallertau Mittelfruh they could be substituted quite well.

Fuggles (English), US Fuggles, US Tettnanger, Willamette, Styrian Golding

US and English Fuggles one could easily replace. The other possible replacements to use are US Tettnanger and Willamette. Styrian Goldings are genetically the same as Fuggles, so could be easily replaced. They are really seedless Fuggles.

Galena, Tomahawk, Columbus, Zeus, Millineum, Brewers Gold, Bullion and Chinook

As these varieties all seem to have this "catty" aroma, one could try and substitute only for bitter (alpha) addition, naturally taking their

differences in alpha acid concentration into account. For aroma addition, one would really need to experiment with substitution.

Golding, East Kent Golding, Yakima Golding and Styrian Golding

East Kent and Yakima Goldings can easily replace each other. Even Styrian Goldings (although genetically seedless-grown Fuggles) could possibly be a substitute for Goldings.

Horizon, Magnum, Simcoe

These varieties have in common their high level of alpha acid content and their low percentage of co-humulone, hence they produce beers with smooth bitter contents. However their aromas are very different, so maybe a substitute for bitter addition will work, but not so easily for aroma additions.

Northern Brewer, Nugget

Northern Brewer usually has an alpha acid content of about seven to eight percent, whereas Nugget is about 14 percent. Their aromas are very similar, hence easy to substitute, with a good cost savings when Nugget is used instead of Northern Brewer. Nuggets are grown in greater quantity.

Perle, Challenger

Perle and Challenger have very similar bitterness levels (seven to eight percent alpha acid) and their aromas are a little alike, hence can be substituted with some experiments. See also above under Athanum.

Sterling, Czech Saaz

Sterling is the fairly new USA variety, bred by the Hop Research Council, to replace Czech Saaz. The alpha acid content is a little higher (five percent) against the Saaz (at about three to four percent), which is a bonus.

Spalt/ Spalter Select

This is such a unique variety that I could not give any advice what it could be substituted with.

Warrior

This is a unique new super alpha variety, unique because it has a high alpha and very nice aroma (with no smell of "cattiness") together with a low co-humulone level. It depends if you want to substitute the bitterness of any other high alpha variety then you can use Warrior, but if you want to replace aroma, then this variety is quite different compared to all other high alpha varieties.



No, because I would for instance suggest you could easily replace Northern Brewer (seven to eight percent alpha) with Nugget (13 to 14 percent alpha) in terms of similar aroma. The cohumulone content of the Nugget and Northern Brewer are the same, which should be another advantage for replacing Northern Brewer with Nugget as well as half the cost.

3. Should You Rub The Hop Sample And Compare Yourself?

If you buy whole (cone) hops, put some on one hand and use the palm of the other hand as a grinding stone. If you do that correctly, you will get a powder. If you do not get a hop powder, you either have not ground well enough or the hops are high in moisture. Keep the hop powder in your hand (do not throw it away and smell your empty hand as some daft "knowledgeable brewers" seem to do) and smell the powder. Should you smell cheese, then the oils have been oxidized, hence you should only use these hops for alpha acid addition and not for aroma addition. What you could do with pellets and also with whole hops to check the quality of the aroma is to make a tea, ie, only put three hop pellets or two hop cones in a pint glass and pour hot (boiling) water on top to fill one third of the glass and swirl it around a couple of times and then smell. Again if you smell cheese then the essential oils have been oxidized and these hops are not very good to use for aroma purposes.

4. Should You Rely on Your Hop Supplier's Advice?

Well, your store keeper should, and it depends on his knowledge of hop buying and his wholesaler's so you should do your own checks to make sure you are getting the quality you want by rubbing them, or making hop tea as described above. You only need to put a small amount (say four cones) in your hand for a rub to be able to tell that they have not been oxidized. Make some inquiries—which wholesaler does your store gets his hops from? Tell him to use the web to get information about the hop crop. You can use an independent marketing organization,

the Hop Growers of America at www.usa-hops.com, or you could look up the hop suppliers, for instance Yakinia Chief at www.yakimachief.com and other hop dealers' web sites. The more you and your supplier know about the hop crop and its possible shortages, the more certain you are going to be about the supply and quality of your hops.

5. Should You Carry Out Comparison Trials?

A commercial brewer who makes the same recipes repeatedly will do small-scale trials to evaluate hop substitutions and selections from a new year's crop. Depending on your normal batch size, you may want to do the same, perhaps producing three gallons of beer with a new hop rather than 10 gallons the first time out.

Conclusion

So those are my thoughts (and a few opinions) on hops and the current state of the hop industry. Since some commercial brewers haven't taken the time to understand hop industry supply issues, you may now know more than they do. More and more, even small producers will be required to contract in advance for their hop supplies to ensure availability of the varieties they

desire. Those who do not will be faced with the need to substitute hops in established brands where the consumer may be acutely aware of flavor differences.

As a homebrewer, you hold the envious position of being able to compare possible substitutions without having to worry about consumer reaction. Who knows, the knowledge you obtain just might be needed by the microbrewery down the road in the coming months and years.

Gerard W. Ch. Lemmens is Sales Director to the craft brewing industry at Yakima Chief Inc. and Vice President of the Hop Research Council. Early in his career, he studied tropical and sub-tropical agriculture in the Netherlands before obtaining a post-graduate diploma in brewing and biochemistry at Heriot-Watt University in Scotland. He was a pupil brewer with Heineken and Whitbread Breweries, then joined Bass PLC in England as a shift brewer. At Bass, he progressed to become a research and development brewer and then head brewer at one of the Bass breweries. It was during his tenure in research and development that he came into close contact with hops and hop suppliers. In 1972, an English hop dealer made him an offer he couldn't refuse—he left Bass to build a pelleting plant and he has been in the hop industry ever since.

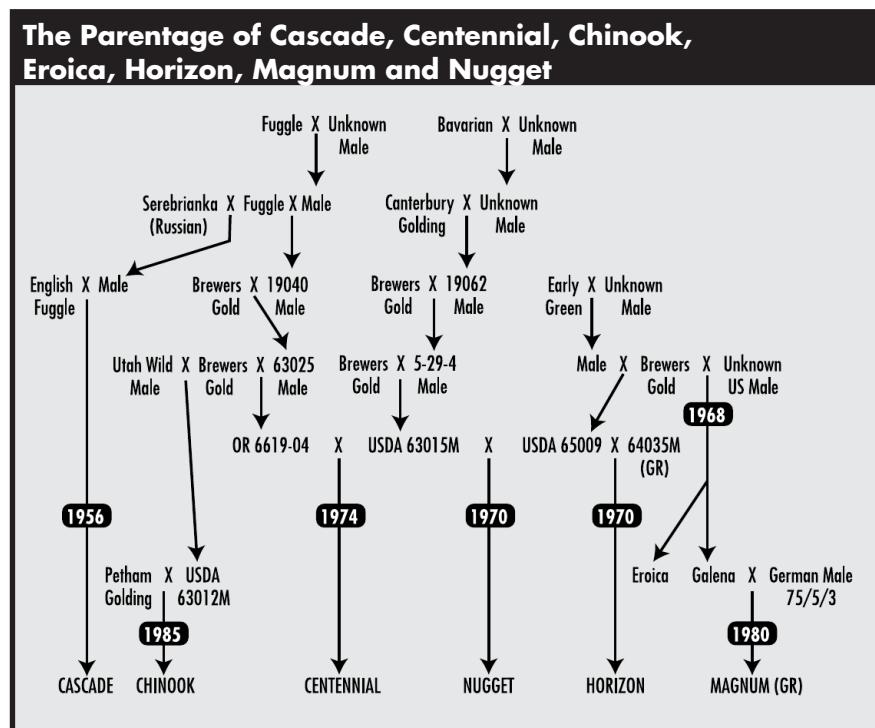
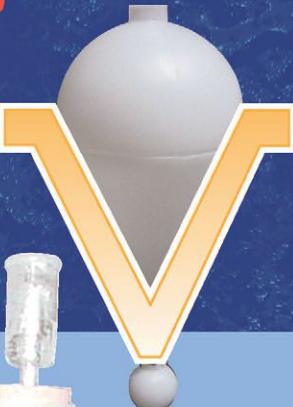


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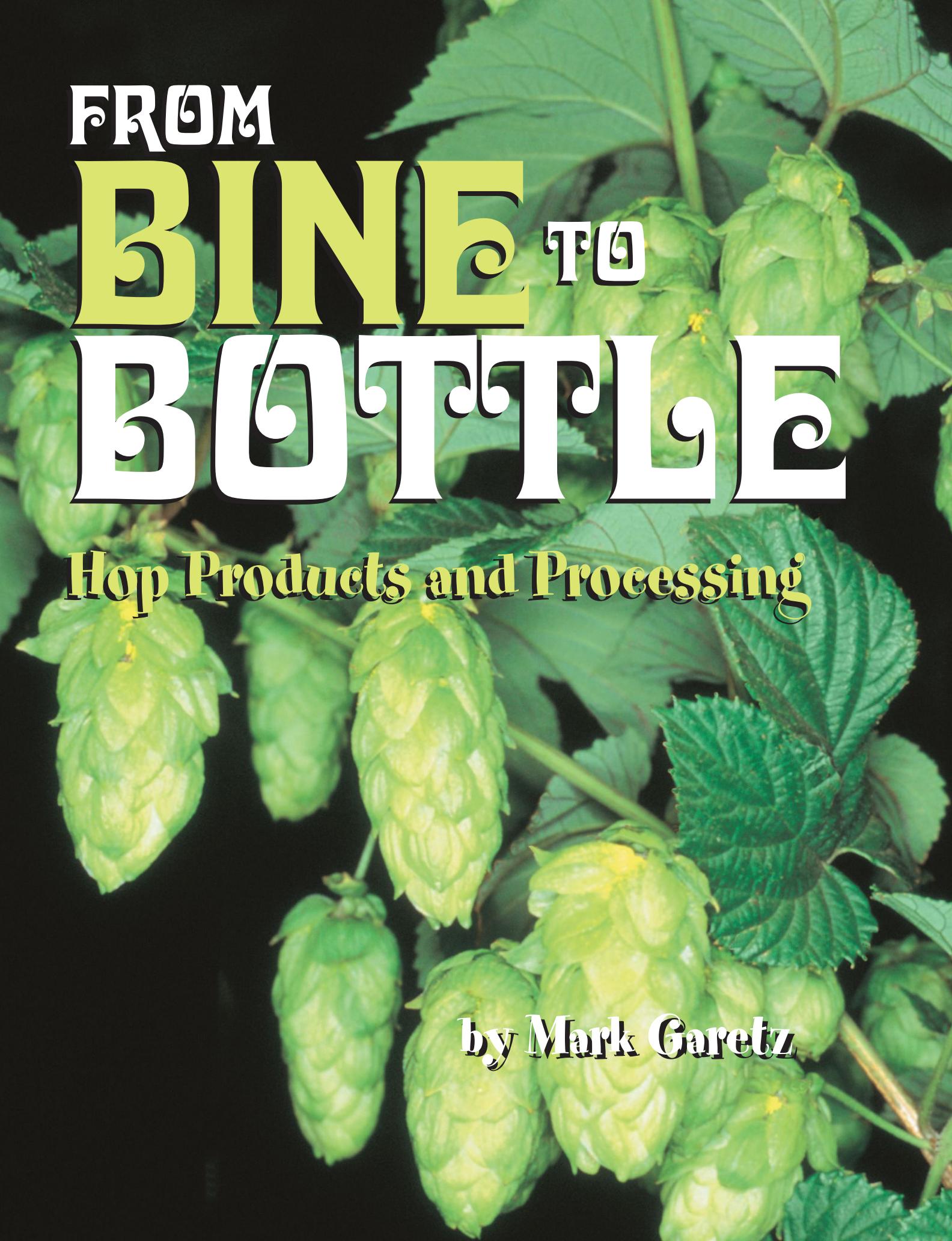
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FROM BINE TO BOTTLE

Hop Products and Processing

by Mark Garetz

In this article we will talk about what happens to the hops from the time of harvest and how they are processed into a form that is ready for use in brewing. The amount of processing depends on the form that the products take: whole hops, pellets, plugs or extracts of some sort. We will describe these products and discuss the relative merits and uses of them.

HOP HARVESTING AND DRYING

All hops crops are harvested once per year, beginning in mid-August and continuing through early September (in the northern hemisphere), depending on the hop variety. Most hops are machine picked these days, but some hop farms in Europe still use hand picking. In any case, the bine (that's the technical term for the plant itself) is usually cut down and either picked by hand or fed into a "hop picker"—a machine which strips the cones from the bines and separates them from most of the leaf and stem material.

Once the cones have been separated from the bine, the hops are dried in buildings known as oast houses or hop kilns. The actual equipment and facilities can vary widely, but essentially the process consists of spreading the cones out on a screen and passing hot air through them. The hops are dried until only about eight percent of the moisture remains. Hops start out with about 80 percent moisture, so if you had one pound of freshly picked hops (called green hops) after drying they would weigh only about 3.5 ounces.

Once the hops are dried, in the US they are baled into 200 pound bales. The bales are made by compressing the hops to about a third or a quarter of their original volume and then wrapping them in burlap to keep the bale compressed. In Europe, the hops will typically be pressed into balloon-shaped "pockets" that weigh about 110 pounds. These are large burlap bags that are stuffed with hops through about three filling and compression cycles. In Europe, hop quantities are commonly expressed in zentners, which equal 50 kilos or 110 pounds, and are sometimes sold this way.

Typically, all of the processing described so far (picking, drying and baling) will be done by the hop grower. At this point, the hops may be sold directly to a brewery that has contracted with the grower or, as is most often the case, sold to a hop broker.

THE HOP BROKER

The hop broker plays a very important role in handling and processing the hops. The first job of the hop broker is to physically inspect and analyze the hops. The inspection looks for features that could affect the flavor quality or storability of the hops. The hops are then analyzed for alpha acids, oil content, aroma, appearance and host of other factors, then sorted into lots based on these criteria. Each lot is assigned a number and the data for that lot is recorded.

As the lots are being made up, larger breweries visit the hop broker to pick the lots they want to buy. One may think that once this is done, homebrewers and microbrewers get left with the dregs. That is not the case (at least in the US—I can't say for Europe). In fact, the hop brokers will typically reserve some of the best lots of hops for the microbrewers, and it is from these same lots that hop suppliers catering to the homebrew trade also buy.

Up until this point, the hops have remained in their full bales. If a brewer uses whole hops (also known as raw hops or by the misnomer leaf hops), they will be bought in this form. But the majority of microbrewers use the hops in pellet form. The hop broker will take a portion of the whole hops and have them processed into pellets. In England, some of the hops will be pressed into plugs. Some of the hops will also be processed into extracts. All of these products will be discussed in detail next, but the point here is that typically it is the hop broker that makes all of these decisions, and performs (or contracts for) all of this processing.



Whole hop plants or "bines" are harvested from mid-August to early September—a machine called a hop picker strips cones from the bines.

Hops are harvested once a year, and they start showing up in homebrew shops in the last few months of the year in which they were harvested. For example, hops harvested in 2001 (called the '01 Crop) will show up near the end of 2001. Hops from Europe can take considerably longer to show up here. They will start to arrive in late December and continue to trickle in until April or later. They will be sold until the end of 2002 or later. As a result of this timing, you seldom see hops for the current calendar year and the crop year always seems at least a year out of date.

WHOLE HOPS

When hops are used directly from the bale, they are called either whole hops or raw hops. (I prefer the term whole hops, so that is what I'll use from now on.) They are often called leaf hops (or even worse, whole leaf hops), but the leaves of the hop plant are not what we use in brewing. We use the flowers, and sometimes you see the complete term 'whole hop flowers' used, though by the time we get them a good portion of the flowers aren't whole anymore.

In any case, whole hops are the least processed form of hops, and are the traditional way that hops were used. Some brewers believe that whole hops provide the best aroma, and the lack of processing may provide some basis for that belief. Although the flowers have been smashed flat by the baling process, most of the lupulin glands are still intact. It is these lupulin glands that contain both the alpha

acid and the aroma oils—the stuff we care about as brewers.

When the homebrewer buys whole hops, there is usually very little evidence left of the baling process, except for the fact that the hop cones are flattened. Sometimes a few chunks of hops are still pressed together, but in general the hops have re-expanded to near their original volume. This is a consequence of handling by the hop supplier, who will have separated the hops from the bale to weigh and bag them.

The biggest disadvantage of whole hops is the amount of space they consume. In the days before oxygen-barrier packaging and refrigerated storage, whole hops used to be in pretty sorry shape by the time you bought them. Pellets have a reputation for being fresher, and in the past there was good reason to believe it. But now it is quite possible for the homebrewer to buy really fresh whole hops, so there is no reason to reject them on "freshness" reasons. I believe their biggest advantage is that they are much easier to filter out of the wort, and I also enjoy the aesthetics of whole hops. But you need to judge for yourself, and more importantly, match the form of hops to your brewing equipment and technique (more on this later).

HOP PELLETS

Hop pellets look just like rabbit food pellets, in fact they are made with the same type of process and machine. To make hop pellets, the hops are first ground into a powder. This must be done very carefully so that heat doesn't build up and cause too much of the

hop resins to be lost or destroyed. The result is a fine powder of hop particles. The hop powder is then pressed and extruded through a pellet die, again taking care not to heat the hops too much while doing this. The hop resins act as a built-in binder to cause the particles to stick together. If the bond was really strong, what would come out of the pellet die would resemble "hop spaghetti" but the weight of the extruded hops causes them to naturally break into pellets.

The hop pellets are then packaged into foil bags and vacuum sealed. The resulting bag takes up less than one-quarter the space of the whole hops. Because they are now vacuum sealed, the hops will have a better storage life. Because they take up so little space compared to whole hops, a homebrew dealer can stock a wider variety of pellets than whole hops and not have to buy lots of freezers or coolers to display and store them in. Microbrewers can now stock a fair supply of different varieties while taking up only a few square feet in the keg cooler.

But something has to be lost in the pelletizing process. In fact, about four to six percent of the alpha acids and oils are lost. Some brewers believe that in this lost fraction, some intangible "goodness" has been lost, and therefore prefer whole hops to pellets. You'll have to judge for yourself. In any case, you don't have to account for these losses: the alpha acid rating for the hops you buy (and if available, the oil content rating) is done after the pelletizing process.

There are actually several types of hop pellets on the market. The most common is the Type 90 pellet. As described above, the Type 90 pellets are simply the whole hops, ground and pelletized. Sometimes on the market are the Type 45 pellets, which are also called "enriched pellets" because part of the inert hop material is removed prior to pelletizing. This is an entirely mechanical process and not done with any chemical extraction. Typically, Type 45 pellets have about twice as much alpha acid as the same weight of Type 90 pellets.

There are also "stabilized" and "pre-isomerized" pellets on the market, but these are rarely encountered. The alpha acids in these special types of pellets have been treated chemically. In the stabilized pellets, magnesium is added to partially isomerize

the alpha acids, and in the pre-isomerized pellets, virtually all of the alphas have been converted to iso-alpha acids. Both are attempts to get better utilization and/or decrease the time needed for boiling. You'll probably never encounter these last two, but if you do, I would advise against using them for late additions or dry hopping, as you would get a lot more bitterness from these forms of hops than you would from other hops in such applications.

When pellets are introduced to the brew kettle, they immediately disintegrate back into powder. The process of pelletizing bursts most of the lupulin glands, so pellets will give a better extraction rate than whole hops for short boil or contact times. For longer times (greater than 30 minutes) the difference is negligible.

HOP PLUGS

The hop plug enjoyed some popularity on the homebrewing scene several years ago, but has almost vanished from the homebrewing scene as of this writing. This hop form has long been used in the UK where it serves as a convenient means for dry hopping cask conditioned ales. The hop plug is technically a Type 100 pellet, and is made by compressing whole (unground) hops into a plug that measures about one inch across and about one-half inch thick and weighs approximately one-half ounce.

The hop plug is compressed to the point where, as with the other pellets, the resins hold the plug together. The hops take up only about one-third the space of whole hops, and are easier to store and package. When the plug is introduced into the brew kettle, the hops re-expand and behave and look just like whole hops. It can sometimes take quite a few minutes to break apart, so this can be a factor if your contact time is short, like at the end of the boil.

The plugs are a reasonable compromise between whole hops and pellets, but they are not without their own problems. If you always add hops in half-ounce increments, the plugs are great. But if you need a portion of a plug, they are very difficult to cut or

break apart. The weight of the plug varies a bit too—they are only approximately half an ounce. It would also seem that it is easy to keep the plugs fresh, but as of this writing, the only plug-making machines were in England. For English varieties, this should be great: harvest, plug and package. But for domestic varieties, the hops need to be shipped to England, plugged and then shipped back again, and this has the possibility of negating any freshness advantages. Lastly, the plugs cost a lot more than either whole hops or pellets.

WHOLE VS. PELLET HOPS

I don't want to get into the pellet versus whole hop debate, but suffice it to say you can make good beers with either kind of hops. What becomes important is how easy they are to store and how they behave in the brewing process.

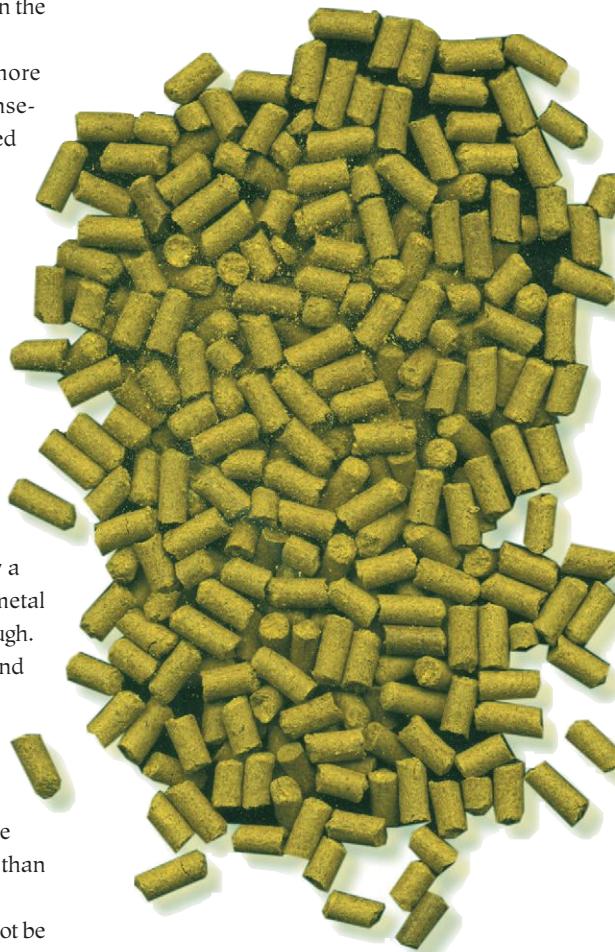
Whole hops take up quite a bit more space than the other hop forms. Consequently, it's harder to keep them stored properly (which is as cold as possible). Unless you own a spare freezer, storing any significant amount of whole hops can become a problem. Pellets, on the other hand, take up a lot less space.

Whole hops also behave quite differently than pellets in the brewing process. When the boil is over, the spent hops need to be separated from the wort. Traditionally, this was done with a device known as a hop back. The hop back was simply a screen (either made from perforated metal or cloth) that the wort was poured through. The hop back was literally a strainer, and it held the hops back (see where the name comes from?) and allowed the clear wort to pass through. The hop back also served the purpose of filtering the trub from the wort, by virtue of the spent hops acting as a finer filter than the screen holding the hops.

Obviously, hop pellet particles will not be caught by such a screen. If a finer screen is

used, the hop pellet particles clog the screen quickly, and wort cannot pass through either. So now we have actually created two problems: we can't effectively filter out the hop particles and we have no means for filtering out the trub.

Both of these problems are solved on a commercial scale by a device known as a whirlpool separator. It works on the principle that if you create a whirlpool with the wort, the heavier trub and hop particles will be deposited in a nice pile in the center of the tank, and you can then draw the wort off from the side, leaving the trub and hop particles behind. While this works well on a commercial scale, duplicating this effect on the homebrewing scale is more difficult. The reason is that the distance (*continued on page 60*)



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Perry

The Other Cider

“Wine made of the juice of Peares called in English Perry, is soluble, purgeth those that are not accustomed to drinke thereof; notwithstanding it is as wholesome a drinke being taken in small quantity as wine; it comforteth and warmeth the stomake, and causeth good digestion.”

From John Gerald's *The Herball or Generall Historie of Plants*,
London, 1597.

Fermented pear juice, simply known as perry, is an ancient fermented beverage with a history that is often overshadowed by its more popular cousin, apple cider. Although pears and apples are both members of the pomme family, there are many important differences.

History

Wild pears (*Pyrus communis*) were indigenous to Central Europe and Northern Asia. Through centuries of cultivation, modern pears evolved from wild pears. The Greek botanist, Theophrastus (circa 372 - 287 b.c.) distinguished between wild and cultivated pears. The first reference to the use of pears for fermentation was by Pliny the Elder (23-79 a.d.) who noted that the Falerion pear made good wine.

The Romans supposedly introduced pears into the British Isles. Country tales say that where wild English pears grow, there was once a Roman villa. Old pear trees are often found among monasteries and churches. Monks from Worcestershire were reportedly great perry makers. Unlike the pagan worship of the apple, there are no religious pear ceremonies which suggests that the pear might have been introduced to England in early Christian times.

The Warden pear, grown in the reign of Henry VIII (1207-1272), was used for perry and as a preservative. This pear was praised for the “austere” flavor before tastes changed to the modern fondness for sweetness. The Warden pear was recommended in *The Booke of Husbandry* (London, 1523).

The French writer, Jean de la Ruelle, named the cultivar “Bon Chretien” which later became known as the “Williams” pear in England and “Bartlett” in North America. Jean de La Quintinye wrote a masterpiece on fruit gardening in 1690 which was translated into several languages. His love of pears was shown by his plans for a 500-tree pear orchard.

Perry became a substitute for wine during the seventeenth and eighteenth century wars with France. John Evelyn promoted English cider and perries in his 1664 book titled *Pomona*.

European writers encouraged the cultivation of pears for fermented beverages. Abbe Rozier devoted 51 pages to pears and perry compared to 45 pages on apples and cider in his 1809 agricultural dictionary.



By Bob Cashew

Thomas Andrew Knight, a famous English fruit breeder, wrote *Pomona Herefordnsis: Containing Coloured Engravings of Old Cider and Perry Fruits of Herefordshire* in 1811.

Perry Pears

Pear trees may be broadly divided into culinary and perry pears. Culinary or eating pears comprise almost all modern production. Perry pears are pears grown specifically for crushing and fermenting into perry. The cultivation of perry pears has been a distinctly English tradition.

In many ways, perry pears bear more resemblance to wild pears than modern dessert pears. True perry pears are small, gritty, sour and astringent. There is a high proportion of skin and core. Perry pears grow many shapes including acute turbinate,

obtuse turbinate, round, oblate and elliptical shapes in addition to the stereotypical pyriform shape with the large rounded bottom, which we associate as pear-shaped.

Perry pears are described by over 200 names for roughly 100 varieties. The apparent alcoholic strength of perry is noted by names such as Merrylegs, Mumblehead, Lumberskull and Drunkers. Varieties of perry pears have changed little over the centuries with some types still popular after 300 years.

Perry pear trees have been known to live two to three hundred years. Some of the perry pear trees planted in 1702 at Hellens manor house are still alive. The longevity of perry pears is captured by the English saying:

*He who plants Pears
Plants for his heirs.*

The longevity of perry pears is sometimes offset by a fifty-year wait to achieve full production from standard trees. This long wait is reduced in modern times by using dwarfing rootstocks.

In addition to longevity, perry pear trees can be incredible producers and massive in size. A tree in 1790 produced five to seven tons per year near the River Wye. Another tree near River Severn in Gloucestershire was known as the "Westbury Tree" and covered nearly two acres.

Perry pears can grow in poor soil as illustrated by the Bare-land (a.k.a. Barland) perry pear. The highly acclaimed Tayton Squash pear grows on the heaviest soil. "Perry may be produced to great profit and advantage on many a soil that will scarcely give back the labour spent on for

other purposes." according to Hogg and Bull in *Apple and Pear as Vintage Fruits* published in 1886.

Perry pears thrive with plenty of rain and sunshine found in the English West Midlands counties of Worcester, Gloucester and Herefordshire. In 1575, Queen Elizabeth I granted the city of Worcester the right to use three pears in their coat of arms. The perry tradition in this area continues with the Three Counties Showground that houses the national collection of 75 varieties of perry pears near Malvern.

The trees were traditionally planted in pastures used for grazing in England. The interplanting of hops with young perry pear trees was also practiced in Kent to produce hops while waiting for the pears to mature. The hops would be removed after the trees were full grown.

Other countries were content to use culinary pears for perry. According to Hogg and Bull, pears were not often planted in Normandy during the late eighteenth century since the French had their cider and calvados. German pears were used most-



ly for distillation to produce schnapps. American production was primarily confined to New England. Colonial American recipes noted that perry should be made from "...the best pears for this purpose are such as are least fit for eating, and the redder they are the better."

Perry Production

"Perry is the next liquor in esteem after Cyder, in the ordering of which, let not your Pears be overripe before you grind them; and with some sort of Pears the mixing of a few Crabs in the grinding is of great advantage, Making Perry equal to the Redstreak Cyder."

—Mortimer

Most pears are taken directly to the mill when the fruit starts falling and the rest of the pears are shaken off the tree. Sound pears must be crushed and pressed immediately after picking whereas apples are usually stacked in heaps prior to milling or crushing. Only long-keeping perry pears are stacked in heaps prior to milling. A small amount of decomposition is much easier to detect as an off taste in finished perry than in apple cider due to the more delicate taste of pears.

Most pears are low to medium in acid levels (0.2% to 0.6%), however some perry pears can have high acid levels. Apples have high levels of malic acid while pears have

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predominantly citric acid. Perry is also lower in soluble nitrogen and other compounds that encourage a robust fermentation.

Most pears have low tannin levels although there are a few perry pears with both high tannin and high acid levels. High tannin levels are reduced by allowing the pommace (crushed pears) to stand for 24 hours to bring down the tannin concentration. Most apple ciders improve with blending. Single-pear perrys are traditionally made since the mixing of perry pears can cause unexpected cloudiness from the complex tannins.

Pears generally contain more sugar than apples. Pear juices can range from specific gravities of 1.050 to 1.090. Perry never had the mass consumption reputation as cider probably due to the higher alcohol. Traditionally, perry is consumed for special occasions, and not as a "session" type drink like apple cider. Perry also contains sorbitol, an unfermentable sugar, which gives the drink a residual sweetness and a fullness of flavor. Perry becomes naturally effervescent when aged. This sparkling characteristic allowed the unscrupulous to substitute perry for more expensive champagne.

Commercial Perrys

Perry is difficult to find commercially. In the United Kingdom, Babycham is a popular drink made from pears—however, traditional English perry lovers hold the light and fizzy Babycham in contempt. Some farmhouse perrys are available in the UK. Get a copy of CAMRA's *Good Cider Guide* for locations.

Although perrys are difficult to find in the U.S. and Canadian markets, fortunately perrys can be easily made with basic homebrew equipment.

Equipment

Perry making requires the same equipment as apple cider. The traditional apple grinder and press is a heavy wooden stand which costs about \$450 new. The grinder has a manual flywheel that rotates a drum

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with teeth. Pears (or apples) are chipped by the teeth into pommace. Presses often have a screw driven shaft that pushes a board (platen) onto the cheeses of pommace. Pommace cheeses are layers of pommace wrapped in nylon, cheesecloth or some other porous material. The cheeses are stacked on top of each other and then compressed. Nylon window screen from your local hardware store makes very good cheesecloth for perry.

A more efficient system can be made if you use electricity and hydraulics. Very efficient grinders can be employed by using a new garbage disposal to grind the pears. Pears are cut into pieces (depending on the size of pears) then pushed into the disposal. A slurry of pommace with an apple sauce-like consistency gushes out into a bucket. There is no need to peel, core or destem the pears since these parts

will be retained in the cheesecloth. Because the disposal is run without water there is a tendency to overheat, which will throw the circuit breaker on the disposal. After the disposal cools down you merely push the red breaker button to start again. Mounting the disposal on a small stainless steel sink gives you a place to stack the pears for grinding. A ground fault interrupt (GFI) receptacle is also a good idea since water and electricity are involved. Extra pressing power can also be obtained by using a car jack or bottle jack in a home-made press. Several plans can be found on the Internet.

If you are using whole pears you should get between two and three gallons (7.57 and 11.36 L) of juice per bushel (about 45 pounds) of pears. The yield will vary based on the efficiency of your grinder and press as well as the condition of the pears.

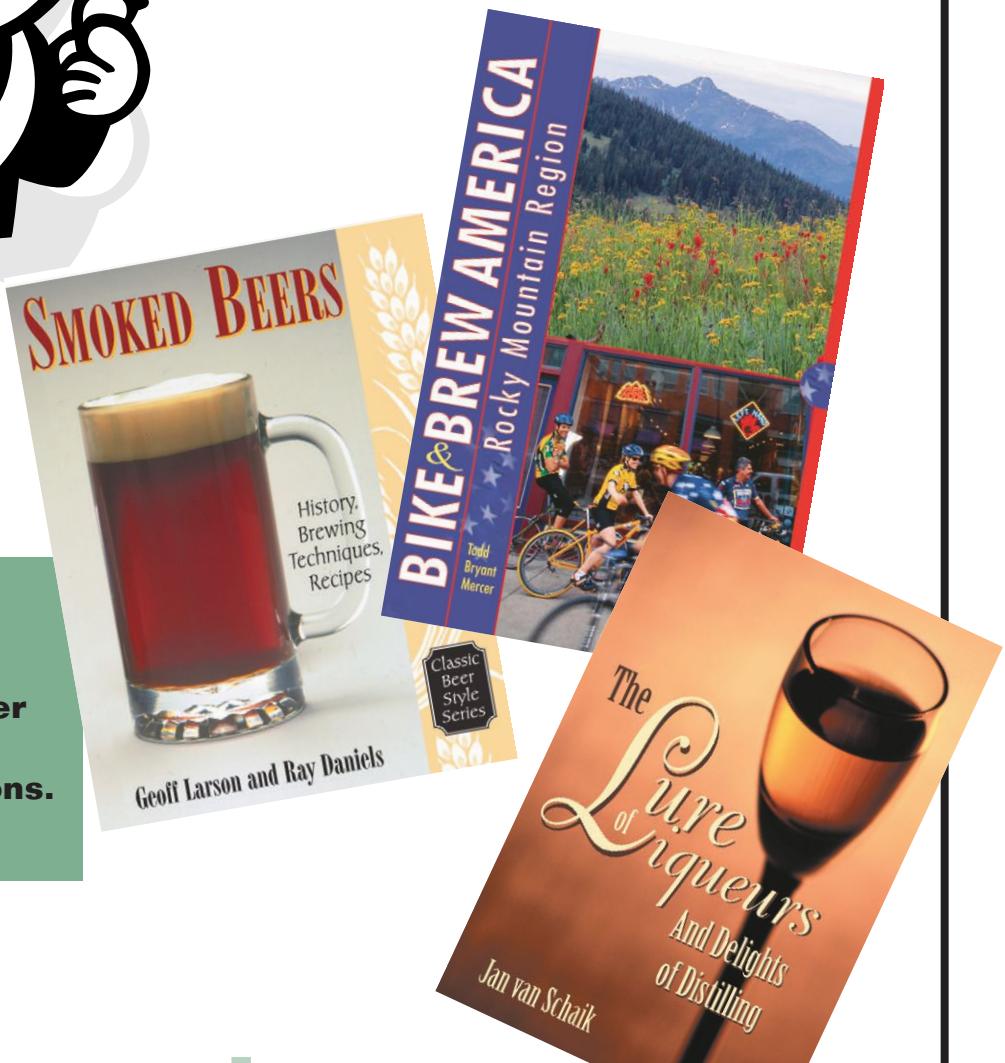
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Homemade Perry

Perry can be made with any type of pear but the best is made from vintage English pears. Perry should be treated as a type of wine. Wine requires acidity, sugar and tannin for balance. Acidity may be measured with a simple titration kit found in wine making supply shops. Sugar levels are measured with the same hydrometer that you use in beer making. Tannin cannot be easily measured without a full-scale lab. When astringency is missing in the unfermented pear juice, tannin must be adjusted or the perry will taste flat.

Perry – 5 gallon batch

- 5 gallons pear juice (19 L) with no preservatives if possible
- 0.5 tsp grape tannin (2.37 g)
- 2.5 tsp pectic enzyme (11.86 g)
- 2.5 tsp yeast nutrient (11.86 g)
- ale yeast or Lalvin EC 1118 yeast

Measure the sugar level and add cane sugar to reach at least 1.050. Check acid level with titration test kit. If acid level is less than 0.6%, add tartaric acid to reach 0.6%. Avoid racking to encourage malolactic activity. Let perry rest over the winter if possible to encourage malolactic activity which smooths taste. Keep carboy topped up to discourage the formation of vinegar. Bottle after clearing.

Blending perry with other fruit is also highly recommended. The use of blackberries and cranberries in the secondary fermenter makes flavorful perrys. Use about one pound of fruit per gallon of perry. It is also useful to add a little cane sugar to encourage refermentation in the secondary.

Growing Pears

If you want to control the entire process, you should consider growing pears. Pears are relatively easy to grow and require much less care than apples. Pear trees are generally more hardy and disease resistant than apples. Pear blossoms are not as susceptible to spring frosts as apples perhaps due to the heavier nectar. Pears will thrive from zone five to eight and tolerate clay soils. The pear family consists of European and Asian types. The European types include the traditional pear-shaped

Further Information

Cider Hill Nursery

Lee Elliott sells English perry pear trees and apple trees for cider. He obtained scions from the Germplasm Repository in Corvallis, Oregon. E-mail ciderhilorchard@webtv.net.

NAFEX

North American Fruit Explorers is an amateur group that exchanges information about pears and other fruits. Dues are \$8 per year for 4 quarterly issues of Pomona. Further information can be obtained from their website www.nafex.org.

CAMRA (Campaign for Real Ale)

The Apple and Pear Produce Liason Executive (APPLE) was formed in the United Kingdom in 1988 to promote traditional cider and perry. An award for the best perry is awarded at the Great British Beer Festival annually.

Cider Digest

This is an Internet newsgroup that discusses cider and perry related topics. You can get great, practical information from around the world. A free subscription may be obtained from cider-request@talisman.com with your name and address in the body of the e-mail.

fruit as well as classic English perry pears. Asian pears, often called pear-apples, are round-shaped with a crisp taste.

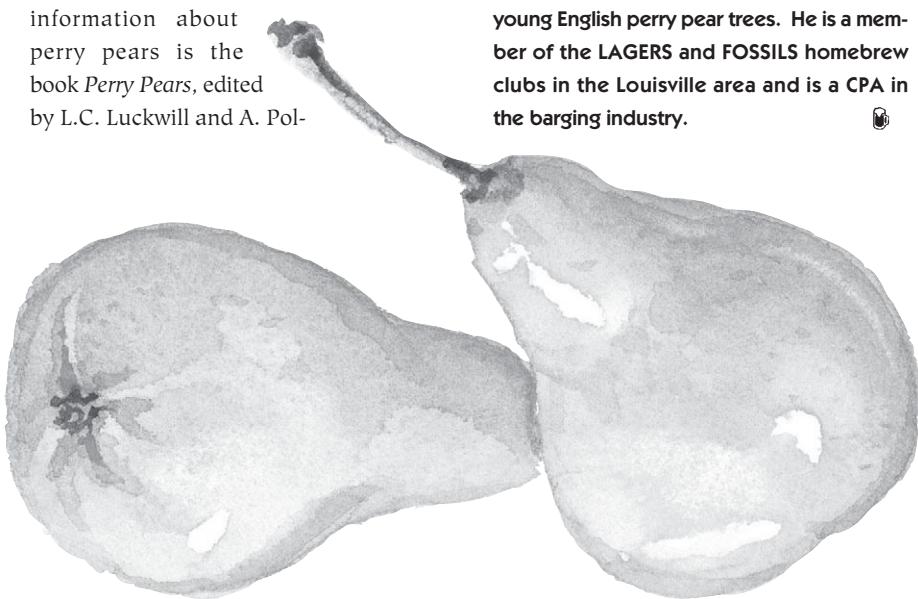
Standard pears grow to 30 feet although many home gardeners and commercial orchards use dwarfing rootstocks, which limit tree growth to one-half of the standard size. Dwarfing rootstocks allow for easier trimming, spraying and harvesting but produce full-sized fruit.

lard in 1963. This authoritative reference describes the perry pears with drawings and color plates to help identify the types of perry pears.

If you are traveling in the UK, I highly recommend CAMRA's *Good Cider Guide*. David Matthews has compiled an awesome work with information about locating perry and cider as well as interesting cider stories. This guide was just issued in late 2000.

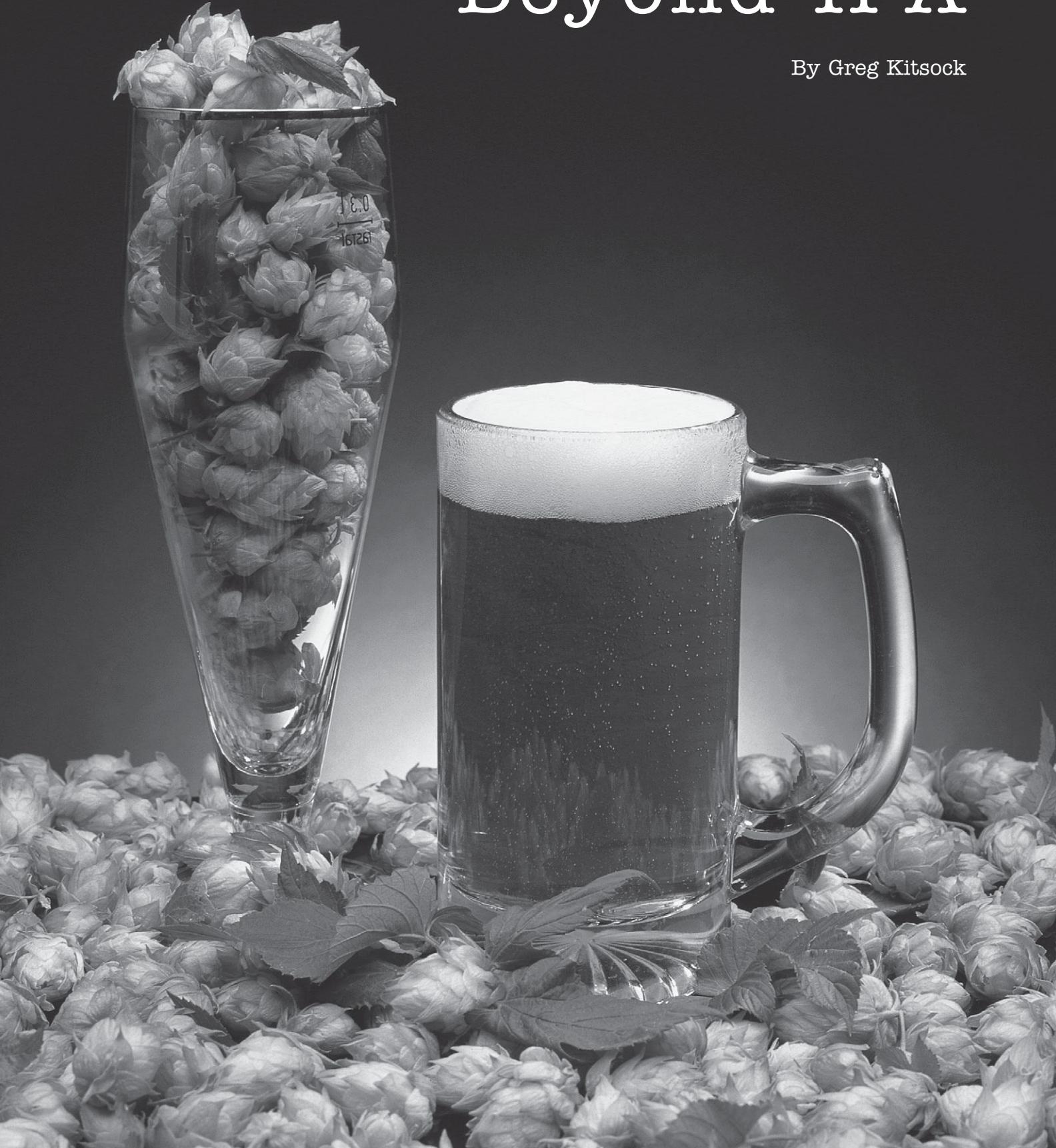
Bob Capshew, a Certified BJCP judge, has been fermenting perries, ciders, beer and wine for 18 years. His orchard includes some young English perry pear trees. He is a member of the LAGERS and FOSSILS homebrew clubs in the Louisville area and is a CPA in the barging industry.

Further Reading
The best source of information about perry pears is the book *Perry Pears*, edited by L.C. Luckwill and A. Pol-



Extreme Hoppiness: Beyond IPA

By Greg Kitsock





Most measurement scales have limits imposed by the laws of nature. It's impossible, for instance, to get any colder than -459.7° F (-273.2° C), a point described as absolute zero. And science fiction notwithstanding, most physicists would find it hard to conceive of a spaceship exceeding 186,282 miles per second, the speed of light. So when we turn our thoughts to brewing, it begs the question: Is there a ceiling on the bitterness imparted by the alpha acids in hops? Can a brewer reach an impasse, beyond which it's impossible to cram any more IBUs into a beer?

American craft brewers are currently testing this hypothesis.

A new category of beers has decoupled itself from the traditional India pale ale niche. They're called "imperial IPAs," "double IPAs" or "industrial IPAs," and they're huge in hops, huge in malt, huge in alcohol. No official parameters have been set for this new style, but these beers flirt with the nine percent abv mark, hover around 20° Plato (1.083 SG) original gravity, and measure between 75 and 100 IBUs. They're more highly attenuated than a barleywine and lack the highly roasted special malts of an imperial stout, all the better for showcasing the absurd quantities of *Humulus lupulus* in their recipes.

John Maier, brewmaster at Rogue Ales in Newport, OR, is no stranger to big, full-bodied beers, and Rogue I₂PA is his gift to hopheads. This powerhouse (nine percent abv, OG: 20° Plato (1.083), 75 IBUs) has 120 pounds of Cascade and Saaz hops added to the boil; an additional pound per barrel of East Kent Goldings is used for dry-hopping. To add a semblance of balance, the recipe calls for 1,980 pounds of grain per 40-barrel batch—the equivalent of eight pounds for a five gallon batch. "We can't pack enough malt in the tun to get the extract we want, so we do a double mash, filling it halfway each time" says Maier.

Large amounts of hops have a narcoleptic effect, making it especially inadvisable to drive or operate heavy machinery after quaffing beers of this sort. "I₂PA is definitely a nightcap," cautions Maier. "I start to yawn and want to take a nap after one pint. I can drink more wine than I can hoppy beer!"

90 Minute IPA, a leviathan of a beer from the Dogfish Head Craft Brewery in Lewes, DE, belies the notion that super-hoppy IPAs are strictly a West Coast phenomenon. "An amazing adventure" is how owner Sam Calagione describes the brewing of this beer, which weighs in at nine percent abv, 18° Plato (1.074 OG) and about 90 IBUs. Each 60-barrel batch, by his estimate, contains more than three million pellets of Cascade, Chinook and Columbus hops, added in a continuous stream during the hour-and-a-half boil.

Calagione said he came up with the notion for this beer while sitting in traffic, musing: "At what point in the boil do the hops contribute less to the bitterness and more to the flavor and aroma?" He began his experiments in continuous hopping with a 60 Minute IPA, but soon learned that adding a parcel of hops every minute for an hour was extremely labor intensive and apt to incite a revolt among his brewers. So Sam jury-rigged a Rube Goldberg-esque invention consisting of a bucket and one of those vibrating electric football games from the 1960s. The game was hung at an angle from the manway above the kettle, and actually did shake in hop pellets at a steady rate until it got wet and conked out. Calagione, as of press time, was building an auger to serve the same function.

Sam still serves the 60 Minute IPA at his brewpub in Rehoboth Beach, DE. The 90 Minute IPA is available in 750-mL, corked bottles affixed with one of the stranger labels ever used by a brewery. It depicts a sideshow performer hammering a nail into his right nostril. "I found

it at the Library Congress in a series on circus freaks," says Calagione. "The picture sums up very well the experience of your first sip."

The Stone Brewing Co. in San Marcos, CA, often known for its Arrogant Bastard strong ale, has been upping the ante for the last four years with its Anniversary IPA. "We're brewing up a sledgehammer designed to hit you over the head," admits brewery president Greg Koch. "It's all about imbalance."

The beer began in 1998, when Koch and his head brewer Lee Chase decided to do a commemorative beer for the brewery's second anniversary, doubling the amount of hops in their Stone IPA. On the occasion of their third anniversary, they tripled the hops. The fourth anniversary IPA had 3.5 times the hops plus an extensive dry-hopping. That one measured 8.5 percent abv and 16° Plato (1.065 OG); a laboratory analysis set the bitterness at 102 IBUs. The Fifth Anniversary IPA, released September 22, has about the same amount of kettle hops as its predecessor but the dry-hopping has been increased by 25 percent.

Chase uses Magnum for bittering, Centennial as his finishing hop, and a combination of Centennial and a little Chinook for dry-hopping. Altogether he adds 80 pounds of hop pellets per 30 barrel batch. The grain bill consists of two-row and caramel 15 malts; Chase reduces the water to achieve a higher gravity.

Asked if such a ridiculously-hopped beer can possibly be cost-effective, Koch replies, "Hell, no!" There is so much trub left at the bottom of the vessel that he'll lose over 12 percent of the volume, with three 30-barrel batches yielding only 75 barrels of beer. Having reached a point of diminishing returns, Koch intends to retire his hop monster after this year. "Our sixth anniversary beer will definitely not be an IPA," he informs us.

One of the first double IPAs was Alimony Ale, a product rightfully dubbed "the bitterest beer in America." Bill Owens, then owner of Buffalo Bill's brewpub in Hayward, CA, came up with the formula in 1986. "My CPA was bemoaning his divorce," Owens recalls, "and the bartender suggested we do a beer to express his feelings. The original

bottle said he was looking for a new woman. We put his phone number on the label."

Alimony Ale was hopped exclusively with Cascades and measured 72 IBUs. "Everybody was blown away that you could push a beer so far," recalls Owens. The only challenger at the time, he adds, was Grant's Imperial Stout from the Yakima Brewing & Malting Co. in Yakima, WA. That one was a tad hoppier at 75 IBUs, but the hops were submerged under an avalanche of roasted barley and specialty malts.

Buffalo Bill's still makes Alimony Ale, and Owens has contract-brewed a bottled version at several microbreweries, as recently as 1996. He says he'd like to do a version in cans (that would be a first!), but he needs to find an investor to pony up the money.

In general, the brewers we spoke with were not attempting to duplicate an old-time recipe, but rather—in the best tradition of our pioneer forebears—to push the envelope, to go into uncharted territory where no man has trod before. The question remains: just how far can they go?

Ralph Olson, a partner in HopUnion Craft Brewery Sales, and Jim Murphey, owner of Murphey Analytical Laboratories Inc. in Yakima, both agree that the solubility of iso-alpha acids in wort will reach a limit. Neither man, however, would cite a figure in IBUs as the upper limit for bitterness. "When you start getting into the 70s and 80s, you're pushing the limit," warns Olson. "You have to be careful: how accurate are your measurements? You can go to three or four different labs and get three or four different figures."

Murphey notes that the IBU content of a beer is usually gauged by creating a solution in iso-octane, then measuring the degree to which the solution absorbs the 275-nanometer wavelength of light. However, other substances in the beer besides the iso-alpha acids can also absorb this wavelength, skewing the results. Murphey estimates that for a dark beer like a porter, the readings can be off by 20 percent. The figure for an amber-colored beer can be in error by five to ten percent.

The formula used to calculate hop additions during recipe development are at best estimates of the actual bitterness that will be achieved in the beer. Furthermore, the

formulas were developed for the more common bitterness ranges. At the high IBU levels attempted by these muscle-bound beers, the estimates can be substantially different than reality.

Lee Chase notes that on paper, his fourth Anniversary IPA registered 160 IBUs, compared to the somewhat less astounding total of 102 that the lab reported back. Chase theorizes that the iso-alpha acids tend to stick to solid surfaces and are removed with the trub. In a similar manner, he claims, you can make an unpleasantly astringent beer less bitter by skimming off the foam.

Vinnie Cilurzo, brewer for Russian River Brewing Co. in Guerneville, CA says he brewed a 120-IBU pale ale when he toiled at the now-defunct Blind Pig Brewing Co. in Temecula. That figure was independently verified by two different labs, he insists. Figuratively speaking, the beer wasn't everyone's cup of tea. "When it was fresh, it was like licking the rust off a tin can, it was so bitter," laughs Cilurzo. "But it had an appeal to a very small market." Cilurzo does a 94-IBU imperial IPA called Pliny the Elder for Russian River, but he says he's gained an appreciation for balance over the years. To give the latter beer more balance, he mashes at the unusually high temperature of 157-158° F (69-70° C) to create more unfermentable dextrins, and also adds an unusually large amount of carapils (dextrin) malt—12 percent of the total grain bill.

Rande Reed, partner and head brewer for Snoqualmie Falls Brewing Co. in Snoqualmie Falls, WA, also suggests that the human palate will impose a limit on bitterness before the laws of chemistry will. In 1996, Reed visited the White Horse Pub in London for the ceremonial tapping of an experimental cask ale brewed by Bass, based on a centuries-old recipe for one of the original IPAs. Apparently, Bass didn't take into account that the hops of yore had less alpha acid than modern varieties. Or maybe they didn't factor in the six to eight month trip to India that allowed those bygone IPAs to mellow out. At any rate, Reed recalls the beer as "absolutely undrinkable."

"It was the single biggest disappointment I've ever had in the world of beer. There was

no carbonation to release the volatiles. It had the most intense bitter grapefruit taste you ever experienced in your life. It almost stopped you from breathing! Think about the taste of old Listerine!"

Reed, this October, will add to hop legend and lore with the release of his winter seasonal "Ralph Squared." The label, which is being designed by beer writer Alan Moen, will feature a Mount Rushmore motif depicting the two Ralphs of HopUnion, Messrs. Olson and Woodall, engraved in stone. Olson, in fact, chose the three hop varieties used in the beer: Czech Saaz, Santiam (a noble hop offshoot) and the big-alpha strain Horizon.

The beer was brewed back in January. Reed added hops to the mash; he rigged up a hopback so the wort would pass through a whole-leaf solution en route to the kettle; he made four separate additions during the 90-minute boil; and he dry-hopped generously. "The only reason I didn't add hops during the primary fermentation was that they would have been scrubbed out with the CO₂," he explains.

Reed has had a sample of the beer analyzed, and it clocked in at a respectable but not overwhelming 50.4 IBUs. "That may sound a bit low, but the focus is on hop fla-

vor and aroma and not on bitterness," he says. Indeed, it's the volatile oils in the hop cone that give craft beer those nuances of grapefruit, pine resin, musk, pepper, etc. that we all appreciate so much. This aspect of hop character is a little bit harder to measure objectively. "I want the flavor and aroma to speak of nothing but noble hops," Reed says of his brainchild.

To experience a different side of the hop, aficionados should look out for one of the hop harvest ales that have come into vogue on the West Coast. These beers are "wet-hopped"—that is, they're hopped with fresh, undried cones rushed from the vine to the brewkettle in as little time as possible. Vinny Cilurzo knows of only two breweries that are making a beer with 100 percent wet hops: one his Sierra Nevada; the other is his own HopTime Harvest Ale.

Cilurzo grows his own hops—Chinook and Cascade—on a quarter-acre plot of ground outside the Russian River brewery. He harvests enough to wet-hop two or three ten-barrel batches. Cilurzo estimates he adds six times as many hops to the kettle as he would for a normal pale ale, but he explains that the fresh cones are heavy with moisture, which dilutes the alpha acids. The beer, however, winds up receiving a

sixfold dose of the hop oils, which results in an amazingly delicate, spicy flavor and aroma with earthy and leafy vegetable overtones. Altogether, for the kettle and dry-hopping, Cilurzo adds a generous 97 pounds of hops—equivalent to 1.5 pounds of hops in a five gallon batch.

These fresh-hopped ales are ephemeral beers. They can only be made during the few weeks in late summer and early fall when the cones have ripened on the vine. The delicate aroma tends to dissipate over time, so the beer should be consumed fresh, like a nouveau wine, advises Cilurzo. Because commercial hop production is limited to the Pacific Northwest, the logistics of shipping the newly picked hops make it impossible for East Coast breweries to make a true harvest ale.

Nevertheless, Cilurzo feels the HopTime Harvest Ale, at 60-some IBUs, captures the soul of the hop better than the much more bitter Pliny the Elder.

In conclusion, then, it's the palate of the beer drinker, and not some analytical chemist, that is the final arbiter for the hoppiest beer.

Greg Kitsock is a regular contributor to *Zymurgy* and the editor of *Mid-Atlantic Brewing News*. 

Russian River HopTime Harvest Ale

HopTime Harvest Ale is brewed with 100 percent fresh, undried Russian River hops straight from the hop vine. When regular dried hops are used, this recipe would be made with one-half to two pounds of hops per barrel (31 gallons) of beer (1.3 to five ounces in five gallons). With this brew, seven pounds of freshly picked hops are added for each barrel of beer. The exceptional hop aroma and flavor is attributed to the fact that the hops were added to the kettle just four hours after they were harvested. Distinctive aromatics and flavors from these fresh hops differ from those found in dried hops because the volatile oils are exactly as they were when hanging on the vine.



Recipe for 10 gallons

- O.G. 1.065 (16.25° P)
T.G. 1.016 (4° P)
6.5% ABV
60-70 IBUs (depending on hops)
24 lb (10.9 kg) 2-row
1.5 lb (0.7 kg) Caramel 40
2 lb (0.9 kg) CaraPils Malt
Use hard water (same set-up as would be used in an IPA)
• Mash Temperature: 154-156° F (68-69° C)
• Fresh, undried Chinook, 90 minute 3 oz (85 gm)
• Fresh, undried Cascade, 90 minute 14 oz (397 gm)

- Fresh, undried Cascade, 30 minute 10 oz (283.5 gm)
- Fresh, undried Chinook, 0 minute 5 oz (141.75 gm)
- Fresh, undried Chinook, 0 minute 11 oz (312 gm)

Ferment with White Labs California Ale Yeast

After fermentation, use fresh, undried hops as a dry hop in the secondary fermenter.
• Fresh, undried Chinook, Dry Hop 2.5 oz (71 gm)
• Fresh, undried Cascade, Dry Hop 2.5 oz (71 gm)



Hop Fundamentals

The Key to Quality Beer

by Ray Daniels



Processing and Storing Your Hops

Every brewer knows what hops are, but even the best of brewers sometimes forgets some aspect of purchasing, storing or using hops. This collection of short items on hops is intended to inform or remind all brewers of basic issues that can help them make great beer.

Consider the Package

In the bad old days, you could walk into a homebrew shop to find thin plastic bags full of hops sitting on a room-temperature shelf. From a quality point of view, nothing could have been worse.

Hops, like most organic products, deteriorate over time. Furthermore, that deterioration is hastened by heat, air and specific wavelengths of light. These days, most hops sold at the homebrew level are properly packaged to ensure long storage life. Suitable packaging is 1) either vacuum-sealed or filled with inert gas, and 2) made of a gas barrier material that does not allow oxygen to migrate inside over time.

In addition, you will see that some hop packages are opaque so that light can not play any role in the deterioration of the hop quality. Since most warehouses and shopkeepers store hops in cold and unlighted coolers, this is a less critical component of the packaging these days and you will see

many perfectly good hops sold in clear oxygen-barrier plastic.

Chilly Reception

When you get your hops home, you should give them a chilly reception by popping them into your freezer. The natural degradation of hops over time is dramatically slowed by cold storage. Thus, ideally, you'll keep your hops sealed in their oxygen barrier packages and hidden away inside the freezer. Since the components we extract from hops are purely chemical, the frosty temps won't hurt the hops in any way. On the contrary, the cold temperatures slow the gradual degradation of the resins and oils that we desire for brewing, keeping them in tip-top shape until they are ready for use. Properly packaged and stored, hops will certainly remain in good condition for two years from the time of harvest—and probably longer.

Dating Pointers

When you use only a portion of a package of hops, you'll want to store the remaining amount for later use. Opening the package removes the protection from oxygen that should have been provided by the original packaging, so they won't last forever. Still, if you close them up and keep them in the freezer, they should be good for at least another couple of months. One idea that can help: keep a china marker around your brewing area and mark opened bags with the date. That way, when you find an open package of hops in your freezer, you can tell how long they have been exposed to air.

a nice hop. Traditionally, hops with low alpha acid values (< 5.0%) were considered to be good flavor/aroma hops. These days though there are some "dual-use" hops that have higher alpha acids and still contribute a pleasant flavor component. Common flavor/aroma hops include Saaz, East Kent Goldings and Cascade (but there are many more great ones).

Flavor Hops

To get hop flavor in your beer, add the hops between 10 and 30 minutes before the end of the boil. Mind you, some hops will give you hop flavor even with a longer boil, but this period gives the best results.

Aroma Hops

Because hop aromas are volatile, the hops must be added very near the end of the boil to achieve any aroma in the finished boil. Hops added in the last 10 minutes of the boil will transmit some aromas to the finished beer—and the shorter the boil, the better the result. Often times brewers who want hop aroma in a beer won't boil the hops at all. Instead, they'll wait until the boil has ended and add the aroma hops to the hot wort. This technique of steeping the hops in the hot wort combines both effectiveness and ease for aroma additions.

We Call Them "Dry" Hops . . .

. . . but they get plenty wet. To get the aroma that you smell when you open a bag of hops into your beer, you need to use a technique called "dry hopping." No one quite knows where this odd term came from, but it basically means that you add the hops after the beer has been fermented. The most common technique is to add the hops to a secondary fermenter or even to a keg or other serving container. Often times brewers will use a hop sack to contain the hops so they are easier to separate from the beer.

To confer fresh hop aroma on a beer, the "dry hops" need to be in contact with the beer for one to four weeks. The optimal contact time depends on the hop, the temperature and on the quantity used. Often the most effective way to determine the optimal contact time for dry hops is by sampling the beer every few days.

Hop Aroma and Flavor

That Lovely Perfume

In addition to adding bitterness to beer, hops are used to create interesting flavors and aromas that range from grassy or herbal to spicy and citrus. These unique flavors come not from the alpha acids that contribute the bitterness to beer, but from another

group of compounds known as the hop oil. These oils (and their various oxidation products) are volatile. This means that they will be carried away with the steam of the boil over a period of 15 to 30 minutes. Thus only those hop additions made near the end of the boil will contribute significantly to the hop character of the finished beer.

Stinking Up the Place

So what should you do if you want hop flavor or aroma in your beer? First off, pick



Bitter Talk

You don't have to do much reading on the subject of brewing to realize that there are a few different systems for measuring hops and bitterness. Let's take a quick look and see what they are all about.

Gold Standard: The major class of bittering compounds in beer are known as isomerized alpha acids. The actual quantity present in a beer can be determined in a laboratory and expressed in terms of milligrams per liter (mg/L) which turns out to be the same as parts per million (ppm).

Isomerization: The catch word in that description is "isomerized." Regular alpha acids are not very soluble in beer and they aren't all that bitter. Here's what happens: when heated, alpha acids change their physical structure, or isomerize, into forms that are both more bitter and more soluble. Since isomerization occurs slowly (and ultimately incompletely) during the boil, the trick is figuring out how much of the alpha

acid added to a brew is converted to the isomerized form to become part of the finished beer. More on this in a minute, but first back to terminology.

IBUs: This stands for "International Bitterness Units." When properly used, the term refers to the actually quantity of isomerized alpha acids in a beer as determined by laboratory analysis and expressed in milligrams per liter (mg/L). Equivalent to "EBU" (European Bitterness Units) and often abbreviated simply as "BU."

Guesstimates: Of course only larger commercial breweries have the technology to routinely do the test required for actual quantification of bitterness in a finished beer. However, formulas exist for predicting the IBUs in a beer based upon the hops that are added. (See below.) As a result, many beers from smaller breweries and homebrewers claim IBU ratings that are estimates or approximations based upon the formulas. Unless they are calculated with great care, such ratings can easily be off by 25 percent or more.

HBUs: This stands for "Homebrew Bitterness Units." This measure takes a step back from IBUs by looking only at the amount of alpha acid added to the brew. To be useful in a recipe, HBU data must be accompanied by information telling how long the hops are boiled. The HBUs of a hop addition are determined by multiplying the alpha acid percentage of the hop by the number of ounces added. Thus 0.5 ounce of six percent alpha acid Cascade hops equals three HBUs.

Ounces and grams: These are the basic quantities used to measure most hop additions. Without other information, the amount of hops added tells us nothing about how much bitterness will wind up in the finished beer.

Alpha acid percentage: All hops are tested to determine what percent, by weight, they contain of alpha acids. This number, combined with other data, allows brewers to control the amount of bitterness they produce in a finished beer. The practical range is two to 16 percent alpha acid.



Calculating Your Bitterness

The Big Picture

The IBUs in a beer are equal to the mg/L of isomerized alpha acids. To calculate the likely IBUs for a recipe, we have to know several things:

- the weight of each hop addition
- the alpha acid content of each hop
- the volume of beer which was produced
- the extent to which the alpha acids are isomerized during the boil

Getting Twisted

Isomerization is essentially a physical twisting of the alpha acid structure. While it is easy to find the other parameters that drive bitterness, the extent of isomerization is much tougher. Here are some factors that affect the rate of isomerization during the boil:

- length of time the hops are boiled
- form of hops (the alpha acids in pellets being more accessible than those in whole hops).
- vigor of the boil
- gravity of the wort during boil
- total concentration of alpha acid during boil
- method of heating the kettle, kettle geometry, etc.
- type of yeast, amount of trub, and filtration techniques used (These factors influence the amount of iso-alpha acid that is removed from the beer after the boil.)

Best Guess

Based on professional brewing literature and homebrew experience, the following "guesstimates" of isomerization have been

developed for pellet and whole hops. Of course these values can't apply universally to everyone, so your results are bound to vary somewhat.

| Boil Time (minutes) | Whole Hop Utilization | Pellet Hop Utilization |
|------------------------|--------------------------|---------------------------|
| 0 to 9 | 5% | 6% |
| 10 to 19 | 12% | 15% |
| 20 to 29 | 15% | 19% |
| 30 to 44 | 19% | 24% |
| 45 to 59 | 22% | 27% |
| 60 to 74 | 24% | 30% |
| 75 or longer | 27% | 34% |

Where:

W_{oz} = Weight of hops in ounces

$A\%$ = Alpha acid level of hop, as a decimal (e.g. 7% = 0.07)

$U\%$ = Percent utilization (or isomerization), again as a decimal, from table above.

V_{gal} = Volume of final wort in gallons.

$C_{gravity}$ = Correction for worts that have a gravity above 1.050 during boiling. This includes every beer with a target original gravity of greater than 1.050, but it also includes most situations where you boil a concentrated wort that is then diluted in the fermenter. When the gravity of the boil is less than 1.050, then the correction factor is equal to 1.0. The correction factor is calculated as follows: $C_{gravity} = 1 + [(G_{boil} - 1.050) / 0.2]$ where G_{boil} equals the specific gravity of the wort in the boil kettle.

If you do all this in metric units (grams and liters), it becomes a bit easier, since the conversion factor becomes 1000: $IBU = (W_{grams} * U\% * A\% * 1000) / (V_{liters} * C_{gravity})$

Ray Daniels is Editor-In-Chief of Zymurgy, and has been known to hop aggressively—we have photos.



The Big Formula

OK, so you know the weight, alpha acid content and likely isomerization of the hops you are adding as well as the volume of beer you are making and its original gravity during the boil (puff, puff, pant, pant), now it is *simply* (hah!) a matter of plugging all this data into a formula to determine how much bitterness you might expect to get in your finished beer. Here's the formula:

$$IBU = \frac{(W_{oz} * U\% * A\% * 7489)}{(V_{gal} * C_{gravity})}$$

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For Geeks Only

Reader Advisory: *Warning!* These pages are rated XG (eXtra Geeky) by the Bureau of Magazine Mucktymucks. Items in this section may contain raw data, graphic functions, full statistics and undiluted biochemistry. Keep away from poets, squeamish novices and others who may find the joyously technical nature of this prose to be mindbendingly conceptual or socially offensive. Also, because of the complex nature of brewing science, there is no guarantee that you will live longer, brew better or win any awards in the next homebrew competition based upon the conclusions presented here.

Great Northern Brewers' Trippel Yeast Experiment

By Dennis Urban and Mark Staples

In recent years the variety of yeast strains easily available to home brewers has increased dramatically. Not only can you find the mainstays of the world styles like Czech Pils, Irish Stout, British Bitter and American Lager, but even more obscure styles like Trappist strains and many others are now available. This has led to much debate within our local home brew club as to which yeast is best for a particular style, especially because everyone tends to have their favorites. Many of the Great Northern Brewers Club (GNBC) members are fanatics of the Belgian Trippel style, and this debate led us to choose the Trippel style for this experiment. Another contributing factor is that Trippels are light and crisp so the yeast characteristics would come through strongly, aiding in our evaluation of the various strains.

The intent of the experiment was to create six nearly identical beers with only one variant: the yeast. To do this we brewed a one-barrel batch and split the wort into six carboys then added a different yeast strain to each carboy. The beers were then fermented and conditioned identically. We collected empirical data along the way and finally poured the beer at a BJCP class and at our November GNBC meeting. The tastings were blind and the tasters did not know which yeast was which until the end.

Are You A Geek Too? Zymurgy is looking for contributions for the "For Geeks Only" section. If you have studied a particular area of brewing science using in-depth library research or experimental data and would like to see the results published here, let us know by contacting Ray Daniels at ray@aob.org or via the mail address listed in the masthead on page 2.

Specifications

The recipe and brewing procedure are straightforward. The recipe contains high-quality pilsner malt, a little wheat for head retention, lots of candi sugar to boost alcohol content and noble hops. The brewing procedure was a single temperature infusion mash with a slow sparge and a long boil.

GNBC Trippel

Recipe for 30 gallons

- 90 lb (40.8 kg) DeWolf Cosyns pilsner malt
- 6 lb (2.7 kg) white wheat malt
- 12 lb (5.4 kg) clear candi sugar (60 min boil)
- 7 oz (198 gm) Hersbrucker hop plugs (2.9% alpha acid), 75 min boil
- 6 oz (170 gm) Styrian Goldings hop plugs (5.0% alpha acid), 75 min boil
- 4 oz (113 gm) Saaz hop plugs (3.0% alpha acid), 5 min boil
- Original Gravity: 1.090

Wort Production

Mashed in with 165° F (74° C) water into preheated mash tun, followed by a 60-minute starch conversion at 152° F (67° C). Heated and recirculated the wort to mash-out at 165° F (74° C). The sparge took almost an hour using 175° F (79° C) water. Boiled for 90 minutes, adding

boiling hops after the first 15 minutes, the sugar after 30 minutes and Irish moss 15 minutes before the end of boil.

Fermentation and Conditioning

In this experiment, all beers were fermented under the same conditions, with primary fermentation at 70-75° F (21-24° C) for 18 days. It must be noted that these temperatures were outside of the recommended fermentation temperature range for some of the yeasts. Following primary fermentation, the beers were racked off the trub into new carboys for two additional weeks at 65° F (18° C). After fermentation appeared complete it was moved into the cooler for three weeks at 45° F (7° C). Once the yeast dropped out and the beer cleared it was transferred



ILLUSTRATION BY
CHARLES STUBBS

Vendor Descriptions of Trippel Experiment Yeast Strains

(Strains listed in alphabetical order by supplier.)

BREWTEK CL-300 BELGIAN ALE #1:

Produces a truly classic Belgian ale flavor. Robust and estery with big notes of clove and fruit in the aroma and flavor. Recommended for general purpose Belgian ale brewing, this yeast also ferments high gravity worts well.

BREWTEK CL-320 BELGIAN ALE #2:

A traditional Trappist strain that is particularly good in Dubbles and Trippels. This strong-fermenting yeast attenuates well and produces a complex, dry, fruity and estery malt profile sought after in fine imported Belgian ales.

WHITE LABS WLP500 TRAPPIST ALE YEAST:

From one of six Trappist breweries remaining in the world, this yeast produces the distinctive fruitiness and plum characteristics. Excellent yeast for high gravity beers, Belgian ales, Dubbels, Trippels. Attenuation: 73-78 percent. Flocculation: Medium to low. Optimum Temperature: should be held below 65° F for best results.

WYEAST 1056 AMERICAN ALE YEAST:

Used commercially for several classic American ales. This strain ferments dry, finishes soft, smooth and clean, and is very well balanced. Flocculation: medium. Attenuation: 73-77 percent (60-72° F, 16-22° C).

WYEAST 1762 BELGIAN ABBEY YEAST II:

High gravity yeast with distinct warming character from ethanol production. Slightly fruity with dry finish. Flocculation: medium. Attenuation: 73-77 percent (65-75° F, 18-24° C).

WYEAST 3787 TRAPPIST HIGH GRAVITY:

Robust top cropping yeast with phenolic character. Alcohol tolerance to 12 percent. Ideal for Biere de Garde. Ferments dry with rich ester profile and malty palate. Flocculation: medium. Attenuation: 75-80 percent (64-78° F, 18-26° C).

into Cornelius kegs and force carbonated. The kegs were stored at 45° F (7° C) degrees for an additional two months before being formally tasted.

Yeast

Yeast strains used were three Trappist strains (BrewTek CL-320, White Labs WLP500 and Wyeast 3787), two general purpose Belgian strains (BrewTek CL-300 and Wyeast 1762) and a neutral yeast that ferments cleanly with minimal yeast byproducts (Wyeast 1056) as a control strain. All strains were propagated up to half-gallon volume starters. The sidebar gives the vendor descriptions of each yeast strain.

Findings

When racked, all six primaries had yeast in suspension and showed signs of continued but slow fermentation. Apparent attenuation varied widely with specific gravities ranging from 1.008 to 1.022. Thanks to the candi sugar, even the lowest apparent attenuation was a hefty 80 percent. After three weeks of cold conditioning, all the beers were bright and no finings were needed. Table 1 shows the gravity history for each yeast strain.

The beers were first formally tasted by BJCP students attending a class on yeast and Belgian style ales. They were evaluated by fourteen students who focused on yeast characteristics and conformance to style. The second tasting was at November's GNBC meeting, with approximately 50 members in attendance. During the educational portion of the meeting, we split members into six groups with at least one experienced judge per group. Prior to drinking any beer we reviewed the Belgian Trippel style description. Many characteristics of this style are by-products of the yeast used for fermentation. We talked about each yeast strain used for the test. The neutral, non-Belgian strain, Wyeast 1056, was used as a control for the experiment. Each group then did a blind tasting evaluating each beer one at a time. An experienced beer judge coached the tastings at each table. After everyone tried all six beers, we decided which one was not the Belgian strain (W-1056), which one we liked best and which one we liked least.

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The overall favorite was BrewTek CL-300 Belgian #1 with over 40 percent of the popular vote. BrewTek CL-320 Belgian #2 followed as a close second with almost 30 percent of the popular vote. The least favorite yeast strain for use in making a Trippel, not surprisingly, was Wyeast 1056 with 80 percent voting against it. Although it was unfair putting one of our favorite all-purpose yeasts into this situation, it clearly demonstrated that using the proper yeast strain is critical for making some styles of beer.

Here are the six strains ranked by the GNBC members from most to least favorite along with qualitative descriptions of each beer.

BrewTek CL-300 Belgian Ale #1

(F.G. = 1.007)

Medium-gold color, with a slight haze. Good foamy head at pour, but only fair head retention. Subdued clove and banana aroma, with some malt in the background. Alcohol

Table 1—Specific Gravity Readings of Tripel Experiment Beers by Yeast Strain

| Yeast | OG | 18 Days/ at racking | 5 days/ FG | Apparent Attenuation |
|---------------------------------------|-------|------------------------|---------------|-------------------------|
| BrewTek CL-320 Belgian Ale #2: | 1.090 | 1.008 | 1.004 | 95.6% |
| BrewTek CL-300 Belgian Ale #1: | 1.090 | 1.019 | 1.007 | 92.2% |
| Wyeast 1056 American Ale Yeast: | 1.090 | 1.011 | 1.011 | 87.8% |
| White Labs WLP500 Trappist Ale Yeast: | 1.090 | 1.013 | 1.013 | 85.6% |
| Wyeast 3787 Trappist High Gravity: | 1.090 | 1.017 | 1.017 | 81.1% |
| Wyeast 1762 Belgian Abbey Yeast II: | 1.090 | 1.022 | 1.018 | 80.0% |

detected in aroma, but it was not overpowering. Spicy flavor with a sweet alcohol bite, good overall balance, and dry finish. This beer was not as harsh as many of the others and had the ability to hide ethanol well. The overwhelming favorite and produced a beer closest to the style guidelines.

BrewTek CL-320 Belgian Ale #2 (F.G. = 1.004)

Medium-gold color, with a slight haze. Thin head that dissipated quickly. Complex aroma with mix of fruits, spices, cloves, and alcohol. Fruity aroma primarily plums and apples. Definite clove flavor

that lasts. Medium bodied, good balance and very complex with alcohol well hidden. Does not finish as dry as final gravity would suggest.

Wyeast 3787 Trappist High Gravity (F.G. = 1.017)

Bright and clear with medium-gold color. Poor head that dissipated quickly. Fruity aroma, with slight clove and possible banana in background, too subdued for style. Aroma was also yeasty with alcohol evident. Spicy flavor with low esters and fruitiness. Off-balance and too one-dimensional, predominately alcohol with no malt sweetness or fruity esters. Finished dry and astringent from harsh higher alcohols. Not enough complexity. This strain produced the brightest beer, but was the last for the yeast to drop out.

White Labs WLP500 Trappist Ale Yeast (F.G. = 1.013)

Medium-gold color, with a slight haze. Foamy head with fair retention. Fruity aroma with subdued cloves and alcohol. Crisp and fruity flavor with noticeable cloves in the aftertaste. No malt sweetness, but some alcohol sweetness. Good complexity of flavors with a dry finish. This yeast did well despite fermentation well above the vendor's recommended temperature range.

Wyeast 1762 Belgian Abbey Yeast II (F.G. = 1.018)

Medium-gold color, with a slight haze. Nice foamy head at pour with fair retention. Fruitiest aroma of all six, with fruity

esters and slight clove phenolics with hints of alcohol. Green apples, possibly acetaldehyde. Smooth, fruity flavor with some malt and more clove in flavor than in aroma. Strong alcohol taste that finished dry but not harsh.

Wyeast 1056 American Ale Yeast (F.G. = 1.011)

Medium-gold color, with a slight haze. Nice foamy head with good retention, best of the bunch. Subdued fruity ester aroma with lots of alcohol, but no cloves or bananas. Slight malt flavor up front that does not last. Alcohol overwhelms all other flavors, finishing dry and harsh. Minor modifications to the recipe and lower fermentation temperatures would have produced a nice blond barley wine.

Summary

This experiment was a real eye-opener. By changing only one variable from beer to beer, it was impressive just how different these beers were and how large an impact the yeast strain had on each beer. Under the circumstances employed for this experiment, the BrewTek strains ran away with top honors in the popular vote. This might be explained by their complexity and balance, in addition to low production of harsh higher alcohols at the elevated fermentation temperatures, all features well suited for Tripel.

In fairness to the other yeasts, we must point out that fermentations were conducted at or above the highest temperatures recommended for many of these yeasts by their vendors. **The results might well have been different if fermentations had been conducted at lower temperatures or if each strain had been handled according to its own “ideal” conditions.** In the end there was not a bad beer in the bunch and all the Belgian strains made respectable Tripels. Also, since individual palates vary, the qualitative descriptions of each resulting beer may be of greater value to the reader than the popular vote placements. Finally, this qualitative information may also be of use to those interested in brewing other styles of Belgian beer where different flavor profiles are desired. *(continued on page 63)*



BY CHARLIE PAPAZIAN

Phenomenal

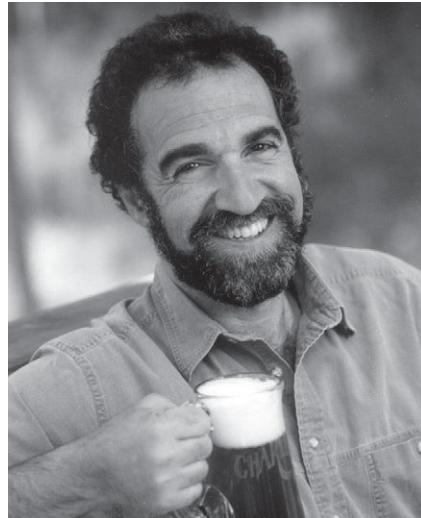
Left Hand Kriek

Phenomenal. That was the word I used to explain a ten-year-old homebrew with no traditional evidence of oxidation; no sherry wine-like character, no wet paper-cardboard aroma or taste, no overtones of rotting pineapple or decomposing garbage. How can this be? Well this was an unusual and experimental beer.

In 1989 and 1990 there was a peak in interest with brewing sour mash beers due to 1988 Homebrewer of the Year Ray Spangler's personal interests in this unique style of beer. And it would be worth mentioning Greg Noonan, author of the pioneering book, *Brewing Lager Beer*, was also intrigued and mentored me along the path of sour mashes. Also at about that time homebrewers were becoming aware of Belgian-style Gueuze-Lambics, beers out of the brewing range of nearly all homebrewers. There were no Lambic cultures of yeast and bacteria even remotely available to the hobbyist.

It got me to thinking in 1990, yes I could make a sour mash beer and produce and control some of the lactic sourness associated with lambic beers. Why not produce a sour beer, using sour mash techniques and then introduce some then-rare cultures of *Brettanomyces lambicus* and *Brettanomyces bruxellensis* I had been fortunate to receive from then U.C. Davis student and soon-to-be author of Lambic, Jean-Xavier Guinard?

Why not? Well, really I was an extract brewer at heart. Yes, I brewed all-grain beers, but the best beers I was making at the time were primarily extract based. So it got me to thinking, thinking, and drinking...and thinking. Could one make a lambic-like beer using malt extract? One barley wine later in the thinking process, I was on my way.



On September 14, 1990 I called Greg Noonan in Vermont and ran my idea by him. He gave a positive nod, with ratios and temperatures. On September 15, 1990 I brewed an extract based sour "mash" lambic wort. Taking three pounds (1.4 kg) of light dried malt extract and diluting it to make three gallons (11 L) of unhopped wort, I raised the temperature to 125° F (52° C). I then added a half pound (225 g) of freshly crushed pale malt (grain), put this "mash-extract" in an insulated container and waited. Over the next 30 hours the *lactobacillus* bacteria on the pale malt soured the liquid as the temperature dropped from 125 to 90° F (52 to 30° C).

Did it work? You bet it did. This liquid was sour indeed. Next step was to strain out the grains, add a small amount of hops and boil one hour. The bacteria was killed off and the sourness stabilized, but was still quite evident.

Chilled and on to the fermenter it went. There, the two *brettanomyces* cultures were combined with a sturdy brewing yeast

(though it was a lager yeast, the type seems to be largely irrelevant).

Racked into a secondary after one month and then bottled after two months the brew was "very, very sour" according to my notes. The gravity dropped from 1.045 to 1.006. My tasting notes indicate 15 months after it was actually brewed I was enjoying a "Very sour and Gueuze-like; excellent" beer with a "bit high carbonation." I considered it a moderate success at the time.

Ten years later I opened the last remaining bottle. It was quite remarkable. As I began this recollection, it's worth noting once again there were no traditional signs of oxidation and it had a moderately good lambic style Gueuze character. The question remains for me, why do Gueuze-lambic beers hold up so well, while other style of beers oxidize their way to disfavor?

I wonder. I enjoy mysteries. I don't really need to know why. I simply need to appreciate what I observe.

So here is my latest attempt at a Lambic Kriek, using a bit of modern wisdom and a whole lot of my own intuition. No need for a sour mash because of the availability of lambic cultures. Yes I know there is a lot of information written over the past ten years by homebrew enthusiasts on the subject of lambic beers. Some of the best stuff has been published in issues of *Zymurgy*. But rather than get overwhelmed by all the recommendations and wisdom, I'm the kind of homebrewer who stills brews by intuition, hoping to stumble on my own little discoveries by not quite doing things the way I'm supposed to.

So let's cut the shuck and jive and get on with the recipe. But keep in mind that this one is still a work in progress. But I have quite a bit of confidence after having racked it once so far. Hmmmm good.

Left Hand Kriek

Recipe for 5.5 initial gallons (21 L)

- 2 lb flaked wheat (0.9 kg)
- 4.5 lb Pilsener malt (2 kg)
- 1.25 lb extra light dried malt extract (570 g)
- 3 oz 9-year-old Hallertauer hops (85 g) 60 min. (The goal is not to add perceptible bitterness.)
- 10 lb pitted sour cherries (17 g)
- 0.25 tsp powdered Irish moss
- 0.5 cup corn sugar (145 mL) to prime Wyeast Lambic Blend (yeast and bacteria)
- Original gravity 1.042 - 1.048 (10.5-12 B)
- Final anticipated gravity 1.004-1.008 (1 - 2 B)
- IBUs — less than 8
- Approximate color: 4 SRM (8 EBC)
- Alcohol: 5% by volume
- Anticipated apparent yeast attenuation: about 85%

Boil the wheat flakes and a half pound (225 g) crushed pale malt in five quarts (4.7 L) water for ten minutes. Then add enough cold water to bring the volume to seven quarts and the temperature to about 147° F (65.5° C). Immediately add the remaining four pounds (1.8 kg) crushed pale malt, stabilizing the temperature at 133° F (56°

C). Hold for 30 minutes. Then add 3.5 quarts (3.3 L) 200° F (93° C) water. Stir and stabilize at about 158° F (70° C). Hold for 60 minutes.

Strain out the spent grains, sparge with three gallons (11.5 L) of 170° F (77° C) hot water and collect the liquid extract. Add the malt extract, hops and boil for 60 minutes. When 10 minutes remain add Irish moss.

Cool the wort to about 70 - 75° F (21-24° C). This can be done simply by immersing the brewpot (with lid on) in a bath of cold running water for about 30-45 minutes. Other means of chilling can be used if desired.

Final primary batch size is 5.5 gallons (21 L). Add additional cold water if necessary to achieve this volume. Aerate the wort very well. Add the lambic blend of yeast and bacteria and ferment at 70-72° F (21-22° C). After about a month or three of primary fermentation rack (transfer) the beer into a secondary fermenter and add cherries. Secondary ferment at temperatures between 65 to 70° F (18-21° C).

After about one to two months with cherries siphon off the beer into another fermenter and leave the cherries behind. Continue fermentation for up to a year. A white "skin" of microorganisms will lie on the top of your beer. Don't be alarmed. It should be there and not disturbed.

When ready to bottle, add a fresh culture of an ale yeast along with the corn sugar and

HOMEBREW BITTERING UNITS (HBUs)

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

INTERNATIONAL BITTERNESS UNITS (IBUs)

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

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

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

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

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

bottle. Age for another six months to a year before enjoying. Or wait ten years, like I did and tell me about it.

Note: 5.5 pounds (2.5 kg) of light dried malt extract or 6.6 lbs (3 kg or two cans) light malt extract syrup may be substituted for all of the above malt grain, extract and wheat ingredients. Skip the mashing process and simply boil the extract in three gallons (11.5 L) of water, later adding cold water to bring the volume to 5.5 gallons (21 L).

World traveler Charlie Papazian is the founding president of the Association of Brewers and the author of numerous best-selling books on homebrewing. His most recent books are *Homebrewers Gold* (Avon, 1997), a collection of prize-winning recipes from the 1966 World Beer Cup Competition, and *The Best of Zymurgy* (Avon, 1998) a collection of the best articles and advice from 20 years of *Zymurgy*.

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BY AMAHL TURCZYN

We have some excellent cold-weather beers lined up for you in this edition of Winners Circle. 'Tis the season for big, warming fireside sippers like Ken Johnson's Old Fearless barleywine, or Peter Zien's powerful Smoked Maple Barleywine. Dark beer lovers will get a kick out of Bob Thompson's porter and Mark Alfaro's Oatmeal stout—classic comfort beers for chilly winter nights. Lager enthusiasts must try Tom Miklinevich's and Tom Watson's malty, aromatic "Kawbunka" Munich Dunkel, and just to mix it up a bit, we've included a clean, refreshing Dortmunder lager by veteran homebrewer Rick Georgette, just to tide you over until springtime.

The Special Edition Winners Circle in the last September/October issue of *Zymurgy* included a few goofs, so please note that the Gold Medal winner in Category 10 (Brown Ale) should have been listed as Steve Bagley and Milan McVay, not just Steve Bagley. Also, runners up for Category 20 (Lambic) should have been listed as follows:

Silver Medal: Doug Faynor of the Capitol Brewers, Woodburn, OR

Bronze Medal: Christopher Dubeau of West Bottston, MA

Barley Wine



SILVER MEDAL

AHA 2001 NATIONAL HOMEBREW COMPETITION

Ken Johnson, Boring, OR

"Old Fearless #1"

English-Style Barley Wine

Ingredients for 7 U.S. gal (26.5 L)

| | |
|------|---|
| 17.5 | lb pale malt (7.9 kg) |
| 5 | lb Belgian aromatic malt (2.27 kg) |
| 1 | lb rye malt (0.45 kg) |
| 1 | oz Centennial whole hops, 11.1% alpha acid (28 g) (60 min.) |
| 1 | oz Nugget whole hops, 14.4% alpha acid (28 g) (30 min.) |
| 1 | oz Cascade whole hops, 4.9% alpha acid (28 g) (30 min.) |
| 0.75 | Wyeast No. 1728 Scottish ale yeast |
| | 0.75 cup corn sugar (177 mL) to prime |

- Original specific gravity: 1.105
- Final specific gravity: 1.025
- Boiling time: 3 hrs. 30 min.
- Primary fermentation: 60° F (16° C)

Brewer's Specifics

Mash grains at 152° F (67° C) for 70 minutes. Prepare a two liter starter of the Scottish ale yeast and pitch when boiled wort is cool.

Judges' Comments

"Could use a little more malt for style but an overall excellent beer. Very nice effort. Give me more!"

"Got some malt aroma but not real intense. Nice balance. Good warmth. Great flavor!"

Porter



SILVER MEDAL

AHA 2001 NATIONAL HOMEBREW COMPETITION

Bob Thompson, Murrieta, CA

"Bob's Best Porter"

Brown Porter

Ingredients for 12 U.S. gal (45.42 L)

| | |
|------|--|
| 20 | lb Klages pale malt (9.07 kg) |
| 2 | lb dark Munich malt (0.91 kg) |
| 1.5 | lb British crystal malt (0.68 kg) |
| 1 | lb dextrin malt (0.45 kg) |
| 8 | oz chocolate malt (0.23 kg) |
| 4 | oz black patent malt (113 g) |
| 1.25 | oz Chinook whole hops (35 g) (60 min.) |
| 1 | oz Cascade whole hops (28 g) (30 min.) |

White Labs California ale yeast
Forced CO₂ to carbonate

- Original specific gravity: 1.060
- Final specific gravity: 1.014
- Boiling time: 90 min.
- Primary fermentation: 12 days at 70° F (21° C) in glass

Brewer's Specifics

Mash grains at 152° F (67° C) for 90 minutes.

Judges' Comments

"Moderate roast malt flavors & bitterness perceived; dominates aftertaste. Slight change in hop schedule might help."

"Good body, creamy, with a pleasant finish. Excellent beer."

Stout



SILVER MEDAL

AHA 2001 NATIONAL HOMEBREW COMPETITION

Mark Alfaro, Chula Vista, CA

"Otay Mountain Oatmeal Stout"

Oatmeal Stout

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

- 20 lb Great Western two row pale malt (9.07 kg)
- 2 lb rolled oats (0.91 kg)
- 1 lb chocolate malt (0.45 kg)
- 1 lb roast barley (0.45 kg)
- 1 lb 90°L crystal malt (0.45 kg)
- 1 lb 50°L crystal malt (0.45 kg)
- 1 lb black patent malt (0.45 kg)
- 1.4 oz Northern Brewer pellet hops, 6.6% alpha acid (40 g) (60 min.)
- 1 oz Fuggle whole hops, 5.2% alpha acid (28 g) (15 min.)
- 1.5 oz Fuggle whole hops, 5.2% alpha acid (43 g) (0 min.)
- White Labs English ale yeast
Forced CO₂ to carbonate
- Original specific gravity: 1.068
- Final specific gravity: 1.020
- Boiling time: 60 min.
- Primary fermentation: 5 days at 68° F (20° C) in steel
- Secondary fermentation: 4 days at 68° F (20° C) in steel

Brewer's Specifics

Mash at 150° F (66° C) for 60 minutes.

Judges' Comments

"Very pleasant oatmeal stout. Liked malt character. Balance could improve just to the malt side. Nice beer."

"Overall, a well-made beer. A little more body and sweetness would make this a really great beer."

European Dark Lager



SILVER MEDAL

AHA 2001 NATIONAL HOMEBREW COMPETITION

Tom Miklinevich and Tom Watson, West Redding, CT

"Kawbunka Dunkel"

Munich Dunkel

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

- 6 lb Pilsener malt (2.72 kg)
- 5 lb Munich malt (2.27 kg)
- 1.5 lb dark German crystal malt (0.68 kg)
- 8 oz torrefied wheat (0.23 kg)
- 1 lb dextrin malt (0.45 kg)
- 3 oz chocolate malt (85 g)
- 1.25 oz Perle whole hops, 7.4% alpha acid (34 g) (60 min.)
- 0.5 oz Hallertauer whole hops, 3.2% alpha acid (14 g) (10 min.)
- Wyeast No. 2124 Bohemian lager yeast
forced CO₂ to carbonate
- Original specific gravity: 1.050
- Final specific gravity: 1.014
- Boiling time: 60 min.
- Primary fermentation: 30 days at 48° F (9° C) in glass
- Secondary fermentation: 30 days at 48° F (9° C) in glass

Brewer's Specifics

Mash grains for 90 minutes at 150° F (66° C).

Judges' Comments

"A fine example of Munich malt complexity, and the sweetness it can create. Nice beer!"

"Nice, drinkable beer. A little sweet for style, but clean and well made. A different yeast would make a drier, maltier example without excess sweetness."

European Pale Lager



BRONZE MEDAL

AHA 2001 NATIONAL HOMEBREW COMPETITION

Rick Georgette, West Bloomfield, MI

[Untitled]

Dortmunder Export

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

- 5 lb DWC pale malt (2.27 kg)
- 5 lb Durst Pils malt (2.27 kg)
- 2 lb DWC Munich malt (0.91 kg)
- 0.75 lb Briess dextrin malt (0.34 kg)
- 0.5 oz Tettnanger whole hops, 4.8% alpha acid (14 g) (65 min.)
- 2 oz Hallertauer Mittelfruh whole hops, 4.2% alpha acid (57 g) (30 min.)
- 0.5 oz Tettnanger whole hops, 4.8% alpha acid (14 g) (5 min.)
- 0.5 oz Hallertauer Mittelfruh whole hops, 4.2% alpha acid (14 g) (5 min.)
- Wyeast No. 2206 Bavarian lager yeast
forced CO₂ to carbonate
- Original specific gravity: 1.048
- Final specific gravity: 1.010
- Boiling time: 75 min.
- Primary fermentation: 14 days at 48° F (9° C) in plastic
- Secondary fermentation: 14 days at 41° F (5° C) in steel
- Tertiary fermentation: 10 days at 30° F (-1° C) in steel

Brewer's Specifics

Mash in pale malt and hold at 130° F (54° C) for 15 minutes. Raise temperature to 143° F (62° C) and hold for 30 minutes. Raise temperature to 153° F (67° C) and hold for 30 minutes.

Judges' Comments

"Very drinkable beer, clear—a little more balance toward hops would make this hit the style. Slight diacetyl may also be masking hops. Good effort."

"Nice balance and slight sweetness. Clean. A very refreshing, well-made beer. Good job!"

(continued on page 63)

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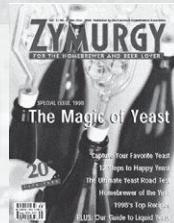
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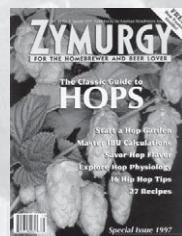
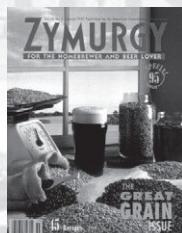
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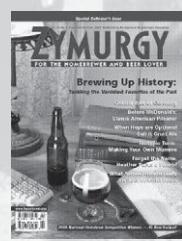
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Hop Formats (from page 35)

from the center to the edge of the tank is much greater in a big commercial tank than it is in a homebrewer's boiling kettle.

You should also be aware that in general, hop pellet particles sink rather than float. This is a useful fact for homebrewers in removing the pellet particles from the wort. If your boiling kettle has a drain in it, all you need to do is let the wort settle so that most of the hop particles (and trub) sink below the level of the drain before you draw the wort from the kettle. You can also use an intermediate settling tank (like your bottling bucket) to accomplish the same thing. If you siphon the wort out of your kettle, let the wort settle and then siphon from the clear, settled layer.

If you use whole hops, you can simply pour the wort through a large strainer or colander, and this will catch most of the trub along with the hops. If your boiling kettle has a drain installed, you can also build the "strainer" into the drain by covering the interior end of the drain with a (new) copper or stainless steel pot scrubber, or use a tube of stainless steel screen with one end attached to the drain and the other end closed (just bend it over). If you siphon the wort out of your kettle, you just attach the pot scrubber to the end of your siphon tube.

So what's the point? The point is that your individual brewing equipment and practices should dictate whether or not you use pellets or whole hops. You may not be able to effectively use one form if your equipment or technique favors the other. If your equipment and technique is flexible enough to handle both, then you have the freedom to use pellets or whole hops (or both) at your choosing.

HOP EXTRACTS AND OILS

What follows is a brief description of the hop extract products on the market. As you probably know by now, the "goods" in the hop are basically the alpha acids and essential oils. For over 60 years hop processors have been making extracts of hops in an effort to make the brewing process either more predictable or more economical, with varying degrees of success. This has led to a variety of products being offered to brewers throughout the years, all based on some kind of extract of the hop. Some of these are designed

only to add bitterness to beer, others to enhance only the aroma and some claim to do both. These three categories of extracts are more sharply defined as: iso-alpha extracts, hop oil extracts, and total extracts consisting of all of the hop constituents (including alpha acids and oils).

The extraction process has been carried out over the years in a variety of ways. Solvent extraction has been used to make all three types of extract, but is most commonly used for alpha acids and total extractions. Steam distillation has been used to extract the hop oils, either directly from the hops or from a solvent-extracted total extract.

The solvents used in the solvent-extraction process have been pretty nasty chemicals. The most common in recent and current use are either methylene chloride or hexane, two highly toxic chemicals. Recently, carbon dioxide has been used as the extracting solvent, and this has met with great success. There are two types of carbon dioxide extraction processes. The super-critical process uses high temperature, high pressure CO₂ and tends to extract everything from the hops. The other type of CO₂ extraction process is the sub-critical process and it uses low temperature, low pressure liquid CO₂. It is selective

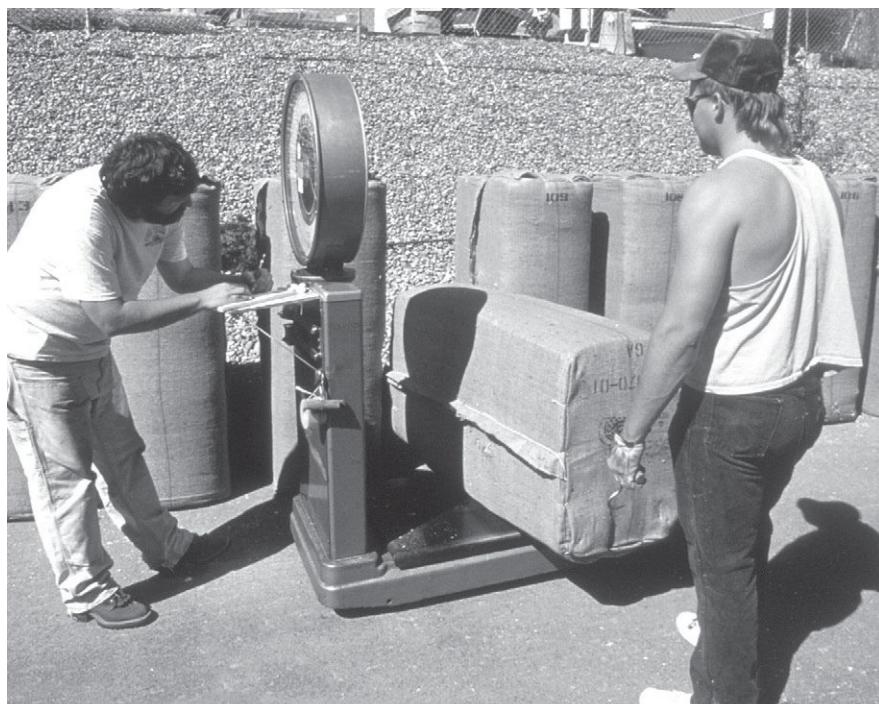
for alpha and beta acids and hop oils. The hops oils are separated by a low temperature, vacuum distillation process. Since low heat is involved, no aroma changes occur.

The point of all this is that you want to make sure if you're buying hop extracts and oils, that you try and avoid those produced with toxic solvents, and for best aroma, those with minimal heat. It kind of all boils down to low temperature liquid CO₂ extraction.

ISO-ALPHA ACID EXTRACTS

Isomerized-alpha acid extracts are used to add bitterness to beer. They will not add any hop flavor, character or aroma. To get maximum efficiency, they are best used at the very end of the process. If added to the wort, they will be subject to the same fermentation losses as iso-alpha acids derived from whole or pellet hops in the boil. If added after fermentation, almost all of the added iso-alpha acids remain in the beer. There are also side benefits to boiling your wort with real hops, so it is not advisable to use iso-alpha extract exclusively to bitter your beer.

In addition to the garden-variety extracts, there are some iso-alpha extracts sold to commercial brewers that have been chemically altered so they are (*continued on page 62*)



Workers carefully weigh 200 pound bales of hops at HopUnionUSA.

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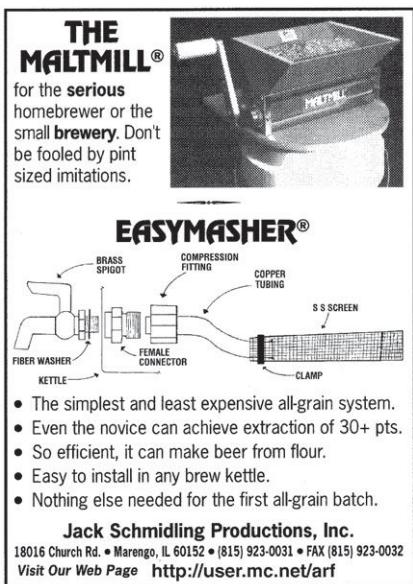
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Whole hop flowers are separated from leaves and pieces of vine after harvest.

Hop Formats (from page 60)

not sensitive to light. This means that the normal ability of iso-alpha acids to cause a "sunstruck" or "skunky" flavor in the beer has been eliminated. In the US, Miller Brewing Co. uses these extracts to bitter its normal beers so they can be packaged in clear bottles. These extracts are not normally available to the homebrewer.

I have seen some iso-alpha extracts on the market that give the brewer no clue as to strength. These are really worthless as you have no idea how bitter you are making your beer. Some are sold simply as a percentage iso-alpha acid (such as 30 percent) and leave it to the brewer to figure out how that relates to IBUs. And some go as far as to calibrate the product directly in IBUs per gallon.

Even though I have stated that it is not advisable to bitter your beer entirely with iso-alpha extracts, they do have many uses. The biggest asset they bring to the home and microbrewer is for use in correcting an under-bittered beer.

HOP OILS

Hop oil extracts have been on the market for many years. Adding these hop oils to your beer will give it hop aroma and will not impart any bitterness. They are primarily used to simulate the effect of dry hopping

by adding the hop oil at bottling or kegging. Some breweries in England use hop oil in the cask instead of real hops in order to get a more consistent product. Recently, some of the hop oils have been separated into fractions that are thought to be responsible for the late hop character in the beer, and these have been offered to home and microbrewers. One could also add hop oil at the end of the boil to get a late hop character (as opposed to a dry hop aroma), but this has only met with limited success. Taste panels all preferred the beers that were late-hopped with real hops.

ical usage rates are between one and three parts per million in the beer). A tiny drop of pure hop oil is enough for many five gallon batches! To measure out such tiny amounts accurately requires micro-fine syringes or pipettes and the difficulty of adequately dispersing such a small amount into the beer has limited the success of the oils. Formulated hop oils that are easy to disperse and measure have come on the market to solve this problem. (This formulation is different than the varietal blending described above: a varietal blend would be subsequently formulated.)

LATE HOP ESSENCES

As every brewer knows, special hop flavors are produced when hops are added late in the boil (e.g. last 15 minutes). Research into the hop oil compounds that produce these flavors has led to products called "late hop essences." These are just the compounds from the oil that are supposedly responsible for a late hop character as opposed to the "fresh hop" aroma produced by dry hopping. Two different late hop effects were identified by the research, each caused by a different "fraction" of the oil. They were identified as the "spicy" and "floral" fractions. The amount needed of these compounds is very small, on the order of 50-150 parts per billion in beer!

The spicy fraction, in addition to adding a spicy character to the beer, affects the beer's mouthfeel. It adds a surprising amount of body to the beer. Before using the spicy fraction, I thought all of a beer's body came only from the malt. Now I realize that hops play an important role in the perception of the beer's body. The floral fraction adds a subtle floral taste to the beer (not a floral aroma). The spicy and late hop essences are sold separately, and the brewer can adjust the proportions of each to get the desired effect.

Mark Garetz is the author of *Using Hops, The Complete Guide to Hops for the Craft Brewer*. He previously owned HopTech, a supplier of hops and hop products to the homebrewer, and HopTown Brewing Company, known for its award-winning, hoppy beers. *Using Hops* is technically out of print in paper form, but is being republished and updated as a CDROM book. For more information please visit www.usingshops.garetz.com.



Hop oils can be derived all from a single hop variety, or produced from a blend of varieties. Hop oils are blended so that a consistent product can be produced from year to year and batch to batch. This is especially important to commercial breweries, who want to make a very consistent beer. The disadvantage of the blends is that they don't resemble a specific hop aroma profile. Hop oils made only from one variety (say East Kent Goldings) are also available, but the selection is disappointingly small.

The pure oils are very difficult for the average homebrewer and microbrewer to use because they are so concentrated (typ-

Winner's Circle (from page 56)

Smoked Beer



BRONZE MEDAL

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Peter Zien, San Diego, CA

"Smoked Maple Barleywine"

Smoked English Barleywine

Ingredients for 3 U.S. gal (11.36 L)

8 lb Maris Otter two-row pale malt (3.63 kg)
 3.5 lb Rauch malt (1.59 kg)
 1 lb Gambrinus Munich malt (0.45 kg)
 1 lb DWC dextrin malt (0.45 kg)
 0.5 lb Hugh Baird 90° L crystal malt (0.23 kg)
 2 oz Paul's black patent malt (57 g)
 1 oz Eroica pellet hops, 13.7% alpha acid (28 g) (80 min.)
 0.25 oz Galena pellet hops, 12.4% alpha acid (7 g) (80 min.)
 1 oz Cascade whole hops, 5.5% alpha acid (28 g) (10 min.)
 Wyeast No. 1084 Irish ale yeast
 3.38 oz maple syrup (100 mL) to prime

- Original specific gravity: 1.103
- Final specific gravity: 1.025
- Boiling time: 90 min.
- Primary fermentation: 11 days at 65° F (18° C) in glass
- Secondary fermentation: 14 days at 65° F (18° C) in glass
- Tertiary fermentation: 8 days at 65° F (18° C) in glass

Brewer's Specifics

Mash grains at 151° F for 100 minutes.

Judges' Comments

"Very enjoyable. Increase the smoke. Don't bother to mention the maple syrup unless you can taste or smell it in your finished product."

"Big malt flavor. Interesting beer. Flavor is better than the aroma. Powerful beer."

Amahl Turczyn is the associate editor of Zymurgy magazine.

Homebrew and Beyond (from page 8)

As a homebrewer, I'm wise to the beguiling tactics of hops. I always buy my hops in less-than-platoon sized lots to minimize troop concentrations. Locked doors separate my brew-kettle from the hop storage area. And while brewing, I never, ever allow myself the luxury of lingering over the smell of hops at the brew kettle. After all, just one good stuporous whiff and I might surrender to the invasion. Worse yet, I might start lobbing pellets toward the kettle myself while bathing in the giddy glee of a good hop rush.

Zymurgy Editor-in-Chief Ray Daniels is being held for ransom by radical elements of the Hop Bitterness Union /International Brotherhood of Utilization (HBU/IBU) in a nondescript Chicago basement. His captors demand that all beers be hopped in excess of 50 BUs.

Geeks (from page 52)

Thanks to all the Great Northern Brewers who assisted with the experiment and to Midnight Sun Brewing Company for letting us use their pilot brewery and facilities. Based on this positive experience, we expect to conduct additional experiments of this kind.

Mark Staples is founder, CEO and occasional brewer at Midnight Sun Brewing Company, Anchorage's oldest brewery. He has been brewing for 11 years. His other passions include hunting and fishing in the wilds of Alaska, playing league hockey and hanging out with the Midnight Sun Hash House Harriers, a "beer drinking club with a running problem."

Dennis Urban is a National Beer Judge and Treasurer of the Great Northern Brewers Club. He lives in Anchorage, Alaska and works as a geophysicist. He has been homebrewing for 11 years and loves to experiment with unusual beer styles.

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The Last Word in Beer

We brewers take a little bit of pride in the fact that the humble art of homebrewing has such an exotic name: "zymurgy." The name is even more special, not just because it's a winner in Scrabble, but because it's often the very last word in the dictionary. Wine connoisseurs can call themselves "oenophiles," but we have the last word. "Zymurgy" trumps "oenology" any day.

But "zymurgy's" place in the dictionary is not guaranteed. Back in the 1950s, Webster's Dictionary followed "zymurgy" with "zythum," which they defined as "a malt beverage brewed by the ancient Egyptians." For better or worse, "zythum" never caught on, and the last word in most dictionaries today is still "zymurgy". But will "zymurgy" always be the final word? Might other words challenge for that special place in the dictionary? It turns out that the language of brewing includes lots of interesting contenders.

"Zymurgy" is a word invented by chemists to mean "the practice of fermentation," from the Greek word "zymē" meaning "yeast" and the Greek ending "-urgy" meaning "working with." But we don't need chemists to make up beer words for us. When the ancient Egyptians learned Greek, they came up with lots of useful words when writing about their favorite beverage. An important person was the "zymurge," a yeast-worker, who knew all about "zymosis" or fermentation, and knew that his barley needed the addition of something "zymotic," which caused fermentation.

Some of my favorite ancient brewing terms come from the Greek word for "beer" which can be spelled either "zythos" or "zytos." A brewer was called a "zytas," a small beer was a "zythion," and long before Uncle Sam, a beer tax was called "zytera."

Want to make beer? A brewery was a "zyturgion." Just want to buy some? Then head for the "zytopolian." Indeed, the

world's first brewers had a word for just about everything. Do you like to get your beer from a woman? Thousands of years before the St Pauli Girl, they called a woman who sells beer "zytopolis."

If we want to lock up the very last place in the dictionary, maybe we should trade in "zymurgy" for "zyturgy," the making of beer.



Personally, I'm not too worried about it. I'm just tickled to know that when it comes to beer, those Greek-speaking Egyptians pretty much said it all.

Francis Dunn is Chair of the Classics Department at UC Santa Barbara and Homebrewer of the Year in the Santa Barbeerians Homebrew Club.

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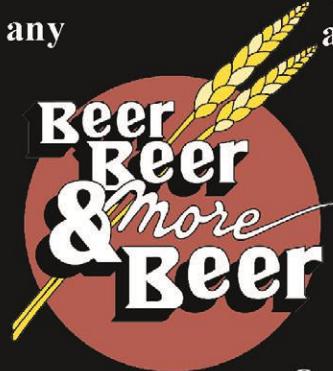
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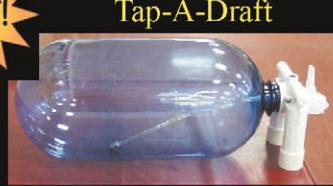


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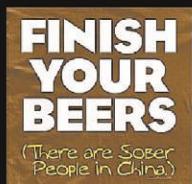


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