AUG 2010

Bee Culture

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CATCH THE BUZZ

INSIDE . . .

ROOT PUBLICATIONS
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Borage is an annual herb, the flowers favored by honey bees, and leaves the flavor of cucumbers. Often grown as a companion plant in vegetable gardens, detering pests from tomatoes, squash and strawberries.

Both flowers and young leaves are edible, and delicious, and it self seeds readily.

– photo by Bill Mondjack

800.289.7668 • www.BeeCulture.com

Publisher – John Root

Editor – Kim Flottum, Ext. 3214, Kim@BeeCulture.com

Production Coordinator – Kathy Summers, Ext. 3215, Kathy@BeeCulture.com

Circulation & Advertising – Dawn Feagan, Ext. 3220, Dawn@BeeCulture.com

Contributors

Clarence Collison • James E. Tew • Ann Harman • Kim Lehman • Ross Conrad
Steve Sheppard • Larry Connor • Connie Krochmal • Jennifer Berry

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V800.289.7668 • V330.725.6677, Ext. 3220 • F330.725.5624
www.BeeCulture.com; email: info@BeeCulture.com

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Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

AUGUST 2010 VOLUME 138 NUMBER 8

FEATURES

DEPARTMENTS & COLUMNS

GLEANINGS-71, CALENDAR-76, CLASSIFIED ADS-77

Bee Bans

I am a beekeeper in Norfolk, VA and there is a bee ban here also. Officially, you can keep bees if you own five (adjoining) acres of land. This translates to no beekeeping, because this is a city after all and there are no privately owned parcels of land of that size. The beekeeper must own the property, you can not rent it or have permission to use it. It does not matter if you own four different properties that add up to 10 acres, it must be five continuous acres. I have lived here all my life, am well traveled and have never seen a property here that would meet that requirement.

To make matters worse, we have an international airport as well as naval airports with incoming flights from parts unknown, this is a large naval port and international shipping port, and railroad hub, so there is an increased danger of importing Africanized Honey Bees. And who is the first line of defense against the Africanized hitch hikers? Beekeepers!! You can own three dogs, three cats and one pig, all in your average apartment, but no bees. Go figure!

Barbra Hickey
Norfolk, VA

Editor's Note: *For more on cities that make keeping bees difficult or impossible check out our NO BUZZ ZONE list at* **www.thedailygreen/environmental-news/blogs/bees/illegal-urban-bekeeping-0602.**

Austrailian Bees In Packages?

In the June issue of *Bee Culture* James Tew reflects on the increased difficulty of successfully hiving packages.

In February, inspired by an observation from another local beekeeper, Mike Thomas, I sent a question to Jerry Hayes of The Classroom. My e-mail and his response were published in edited form in the May edition of *ABJ*, my follow up e-mail was not printed at all and the column heading was Politically Touchy, which seems a curious title.

In essence my question was, what happens to the circa 400,000 colonies that are imported from Australia each year to pollinate the almond crop in California? Australia does not knowingly have *Varroa* mites, these bees are presumably not *Varroa* tolerant and having been in the mix with local bees the Australians surely won't take them back. Is it possible that they are purchased by some commercial beekeepers and used to supplement packages? (We have all seen advertisements in bee literature for x number of colonies 'available after the almond season.') And if so, would that go some way to explaining the apparent deterioration in the quality of packages from some providers?

Jerry's answer, to paraphrase, was that because Australian bees are weak genetically, not having been exposed to *Varroa*, they succumb rather quickly in the U.S. but that any who do survive can mate with our bees and make them weaker genetically. He conceded that no one seems to be tracking these bees, confirmed that they are important for the success of the almond crop and argued that the only alternative to Australian bees is the opening of the Mexican border and the import of AHB colonies.

I don't agree with the last of these assertions (recent news about self pollinating almonds is intriguing and controversial.) Meanwhile we are advising local beekeepers to request specific confirmation from their suppliers that there are no Australian bees in any package they order.

Jeremy Barnes
Seven Valleys, PA

Bees And Oil Spills

I don't know where to turn for information these days. I thought maybe you might be able to help.

I am a beekeeper on the gulf coast. My boys, ages six and eight (and these days even my husband!) help with the bees. I have three hives and have been a beekeeper for three years now. With the help of a great mentor, I am finally beginning to get the hang of this. My hives are strong and healthy, and I have already extracted 17 gallons of honey so far this spring in spite of the cool wet weather (not including another 12 gallons that I lost due to my own foolishness, but that's a story for another day).

I live on a peninsula surrounded by the intracoastal waterway and Perdido Bay. Because we are so close to the water, the stench and fumes from the oil spill are often very heavy here.

This is a very humid area to begin with, and now with the oppressive heat and (occasionally) very still air, the fumes are particularly noxious. I have heard, and read, and been told that if my children or I become ill from the fumes, the best course of action is to limit exposure by going inside to the air conditioning. That course of action has worked so far for us and has relieved the headaches and nausea and difficulty of breathing. Yesterday I even kept my dogs inside ALL DAY because of the fumes. If it's not good for me to breathe, it can't be good for them to breathe either!

So, I'm sure you can see where I am going with this . . . I can't keep my honey bees inside or limit their exposure! What can I do to protect them? I was particularly concerned yesterday. At 11:00 a.m., when the temp was close to 90° and the sun was shining, the wind was still, and the fumes were extremely heavy, I only had about 25 bees on the front of each hive. There was very little activity around the hives. I saw maybe five bees approach the entrance per minute. That was very unusual for them. I put the dogs inside and took the boys and left for the day to escape the fumes. I checked the bees upon returning last night and was relieved to see them bearding on each hive, though not near as heavily as I expected. I will continue to monitor them, but

other than that, I don't know what I can do.

As you know, the gulf oil crisis is a huge mess. I have spent a good deal of time on the phone with various county officials, offices, hotlines, information lines, websites, etc trying to get specific answers and no one seems to have any! I know that "THEY" have been regularly testing the water and air quality on Perdido key (across the intracoastal canal from us) and have issued swimming advisories. I can't seem to get out of anyone who "THEY" are and what the specific test results are. I did contact my local apiary inspector and he promised to help find answers as well, but did not have any information at the time I spoke to him.

I'm also concerned about the quality of the honey the bees are producing. Do you have any suggestions? Information? Phone numbers? Websites?

I know this is a rather lengthy email and I appreciate you taking the time to read it. I hope to hear from you soon.

D.B. Waltrip
Florida

Editor's Note: *Our queries to experienced beekeepers, animal health and people health officials, as well as beekeeping regulators in several states was a resounding . . . "We don't know." Several had experienced similar exposure events in the past and when all was said and done the bees seemed essentially unaffected. But long term studies and follow up data hasn't been undertaken, so . . . we still don't know. If you can, let us know how things shape up later this year.*

A No Buzz Neighbor

First let me thank you for all you do in bringing folks the best in beekeeping information that can be had. I've read your work in books, *Bee Culture* and in your email newsletters and I thoroughly look forward to reading all of them.

I doubt there is anything you can do but on the off-chance you might have some ideas, I'm giving it a go.

I live in a townhouse in downtown Tallahassee, Forida. Some years ago I got some bees and failed miserably at keeping the first package I bought. Yeah. I know. I only bought one. But I learned a lot in the process of failure.

A short time after my hive failed I got a postcard in the mail about a new group of folks in town who were starting a Beekeepers Association. And the Apalachee Beekeepers Association was formed - about 100 - 150 strong now. And it's an awesome group of people. I heartily recommend to anyone interested in bees to hook up with their local beekeepers association. It's well worth it.

The next Spring I got two nucs having had the benefit of shared knowledge of folks who have been keeping bees all their lives. One has kept them for over 65 years. His son perhaps 40 + and grandson maybe 25. So our group has maybe over 500 years experience collectively all under the roof of our Leon County Agricultural Extension Office. The Extension Office under the direction of Les Harrison has been really great accommodating us and sharing knowledge and real estate to have the many programs our group has had over the past couple of years.

Things were really going well when all of a sudden one neighbor really began complaining. She said "My father was a beekeeper and he said you should never have them that close to the house." I tried to persuade her using just about every argument. It was impossible. Then clear plastic ziploc bags of dead bees began appearing on my front porch. I asked her if she was the one responsible and surprisingly she said "Yes." I asked why and she said "I wanted you to see how many are coming to my porch light. I told her it resembled a scene in the movie "The Godfather" and asked her not to do that any more.

I tried putting up blinders to keep the bees from going to her lights. I tried repositioning them so they faced away from her area. Nothing worked. The ziploc bags of dead bees kept appearing. And she persisted in her complaints.

I have no control over the lights on her house. Personally, I never use lights outside my place all night. I'm a firm believer in keeping them off so as to avoid "light pollution," a term I believe amateur

astronomers coined. I like to see the stars, moon and planets at night if I can. With too much light, it can't be done. I cannot persuade her to keep them off.

Moving them to another place on the property will not work because the only available areas are very damp and heavily shaded and therefore very conducive to pests like Small Hive Beetles and Wax Moths.

Putting them on the roof would require major structural modifications and the consent of the town home association, and an extension ladder to reach the roof which is up two stories.

She phoned our local association and unbeknownst to me one of the officers came to my house and spoke with this woman having examined our contiguous yards. The officer from the association left a note on my door asking me to call her. She said the woman was not to be persuaded.

In short I had to give two very healthy hives away to preserve the peace. And since then, there has not been much of that. But that's another story.

Because of my work (I work two jobs) my time to travel to other locations is limited. So I am unable to devote the attention necessary to maintaining a decent tiny apiary if it is located at a distance from my house. I am not seeking to become a large scale operator or much larger of a small scale one either. My wishes are to be a beekeeper with two maybe three hives.

My thinking has been this is pretty much over until I can either move or she does. But when I saw your email this morning, I thought, well here's a source I haven't tried and seeing your offer, well the rest is what you see here in print.

Anyway, I thought I'd try once again. If you have any ideas I'm eager to explore them. In the meantime, to get my bee "fix" periodically some good and kind friends in the

Apalachee Beekeepers Association call me to go out and "work" with them and their bees. I can tell you I've learned more from good folks like Elmore Herman of Millie-Bee, Laurence and Bobby Cutts of the Cutts Honey House and Beetle Blaster fame, Bob Jackson of Jackson's Apiaries, Ed Oaksford and many others than I would ever have learned on my own. Mentorship is everything in beekeeping – mentorship and a good library with your literature included!

Perhaps someone in your readership has some hitherto unconsidered ideas. Ultimately it may require a geographic cure but until that time I'm open to any good ideas. Thanks for your time and consideration and most of all for your dedication in the work you do bringing folks the best in beekeeping information that can be had. I really appreciate it.

Steve Bamford
Tallahassee, FL

Editor's Note: *I hope readers can help, but your comment on moving seems the most logical solution for now. I would, however, consider using that damp and shady spot. A good, high hivestand would help, and you can mitigate some of the problems with excessive shade. Let us know how it works out.*

The Best Smoker Fuel

What's prompting this email is the June 2010 *BeeCulture* article about "Smoke." In my 25 years of beekeeping, the best fuel that I've found is wood shavings. I take my chainsaw and *cut with the length* of a hard wood log creating long, thin shavings. Once dried, they start very easy and produce abundant cool smoke. I don't have to worry about a newspaper starter, wet pine needles, toxic fumes, etc. In one hour, start to clean up, I produce enough shavings to easily fill a trash can, about two to three years supply for my five to 10 hives.

Eric Nitsch
Westfield, MA

INNER COVER

We clearly don't know how to handle success. We weren't prepared for the bees to even do, quite simply, as expected. We weren't ready. We don't have time to do the tasks these bees have outlined out there for us. We don't have the supers or the frames, the pails or the jars, we don't have the labels or the boxes, let alone the storage space to keep it all, even if we did.

We weren't prepared, we don't have the time to spend the time in harvest mode, and we don't know what we'll do with all the honey that all these bees have made, even if we are able to gather it in.

Two colonies wintered over . . . down from four last season . . . take losses in the Fall even beginners know so you have winners in the Spring. From four to two. But two robust and ready hives emerged this spring. Lots of healthy bees survived, in spite of a less than ideal Winter. Who am I kidding, it was a terrible Winter – a long, cold, snowy Winter . . . bees in these parts did not do well at all. It was too bad for too long.

But if bees in a hive stretch from side to side then honey can't hide and bees don't starve. Those Fall-combined hives had bees from side to side and bottom to top and lots of honey between. And they didn't have problems at all.

Come Spring there were bees galore in all those boxes.

The reigning queens in these two hives are supersedures, one after another after another with no interference from us. Way back, the first Royalty came from swarms from unknown places captured years ago. Now, one is louder than I like . . . always the last we work. The other is as quite as a sleeping cat, and if you listen close she purrs when you scratch her ears to look inside.

This Spring packages arrived, like teenagers just off the bus all loud and noisy and clamoring for food and drink and more. And there was food aplenty for everybody new. Honeys and pollens and all-aged brood from the two from before were quickly shared . . . and like loaves and fishes there was more and more. But still those two had more than enough and from them smaller hives were borne with bees and brood and still more food to share. Those two . . . so generous, prosperous and parent-like.

So at first the yard was only two. Then six, then nine and all of 11. But it went to nine again as package queens let go and forces had to be joined. When all was said and done, nine stand together tall, guardians out back, a community of bees.

Here's why.

Like fanatic zealots we take care of the bees that take care of the bees that go into Winter, all season long. To begin we are certain our bees by August are pure and clean and without fault . . . no mites at all or as close to none as we and the bees can be – that all-season task that begins with the willows with sugar dust and drone comb. These bees now tolerate a lot of mites, but we get rid of some anyway, and some are still left behind. The bees though, they don't care and have the healthy attitude of 'live and let live.'

A proper diet all season long, lots of honey and kinds of pollen, stocked in the pantry-part of the hive. Mostly this is by the bees, but we collect and share so they eat only what they make . . . nothing store bought at all. And for Winter . . . for Winter make sure there's so much food that nobody could eat it all, and it will be just enough to last to Spring again.

By August we're as sure as we can be there's no disease or none we can find. And without mites even if troubles dare show, they are less and less and less annoying. It's like when your granddad had bees, way back when.

With enough good food all season long, no mites to speak of, no chemicals at all from without or within, and careful and continuous inside renewal . . . your bees will thrive.

It's a task, for sure, but making sure that the bees that take care of the bees that overwinter are healthy, wealthy and wise is the first best thing you can do to make sure your bees next Spring are as happy and healthy as you want.

And it starts in earnest in August.

•

Some of us start selling at seasonal farm markets right about now. Of course farm markets in some places have been open since April, with Winter crops held over, and Spring plants for gardens for the rest of us, along with greenhouse-grown lettuce and salad fillers. But most of us just started getting things in late June or so, and now, in August everybody has lots of everything, and it's time to sell because we can't even conceive of eating it all. I'm not sure what we were thinking when we bought a whole flat of tomato plants and six kinds of Summer squash, but be did, and we planted them, and now they are taking over the whole back yard. But I digress . . .

Farm markets should be profitable and educational for you and your customers, and even if you are already selling, maybe these hints from successful sellers will help you do even better.

Take Care Of The Bees. Farm Marketing.

Unless you are at a market with so little traffic that you can see from one end to the other all morning long, get some help. If you can, have someone there that has first responsibility to take money and put the sale in a bag. You can't do justice to a customer who simply wants a jar of honey when you are answering somebody's question. And encourage those questions. Put up a sign . . . Don't Know, Just Ask . . . or something.

Have enough change and a place to put it. A box big enough to be seen, and heavy enough to notice, and enough places inside to put all the bills and all the change and all the cards you might collect, and have a note pad and a tied-on-a-string pencil inside so you can always find it when you need to make a note.

What about tasting? It's great if you can, if the market rules or the city rules or the county rules or the state rules don't forbid it. A lot of places do, a lot of places don't. Make sure you know, and if you can, make sure you do. How? It can be time consuming and distracting if you're busy. You dispense certainly . . . no double dipping allowed. But use those little spoons . . . they're cheap and easy, and you can put a dollop on a spoon with a squeeze bottle with a spout real easy. Give customers a choice, ask which one they like best, and make the sale. Refrain from asking if they like one or the other. Kind of corner them into which one they like *best*, so they make the right decision, which, of course, you reinforce by agreeing with them . . . "Yeah, that's the one I like, too", or, "Yeah, most folks like that one best, and I'm almost sold out", making it rare, rather than a commodity in cases back in the truck. And have a sign that says "Want to taste? Just ask," so they ask, rather than you having to ask *them* if they want to taste . . . it saves time for both of you. And have a place to put that spoon, at eye level if possible, clearly marked.

It's 'green' to bring your own bag when you go to a market and lots of people who come have them now. But not every one does, and those who don't need something to carry your best home with them. Have bags. You can get them almost anywhere, save them from the store, or even have a sign asking for donations. But have them.

Recipes. Have several different kinds. You can get some from the Honey Board for free and more for a fee and they're great. But here's a thought. If you are shrewdly marketing your rather average "Wildflower" honey as instead, *Perfect Tea Honey*, or *Baking Master Honey*, or *Better BBQ Honey*, because your wildflower honey actually is better for tea than baking, or is perfect for BBQ sauce because it's just the right flavor and color. What, you haven't tried that yet? Well, you should, you know. It gives a customer who isn't quite decided that little extra push that you don't have time to because you're busy answering questions, or making change. And it gives them one more reason, one more use, one more solution, to buy honey and to buy *that* jar of honey, from you. So you see what kind of recipes to have, right? Baking with honey recipes, BBQ sauce recipes. Lots of them. Free.

Do you know your audience? What size container do they want? Are they looking for bargains and want that five pounder, or looking for honey without a lot of money, so they want that six ouncer. Price accordingly, and have enough of the right sizes . . . displayed . . . so everybody knows at a glance you have what they want.

How much to sell for? That's easy, or not, depending on your situation. If there isn't anybody else selling honey at the same market, and some markets want only one of each kind of seller, or a very few different sellers anyway, then your price is the best price going. But still, you have to sell it for enough. If there's competition, then . . . yes . . . you still have to sell if for enough. If you let that commercial gal with a couple hundred colonies influence your price, you'll probably go broke sooner rather that later. Simply, you have to know your cost, and that sets your price. Don't negotiate with customers, and don't compromise your goals. If you don't sell honey at this market because someone else is way underselling you, move. Or better, make your honey worth the higher price. Local. Varietal. Seasonal. Something that differentiates yours from theirs. Maybe it's just more informative signage. Or more info on the label. Or even a bouquet of the flowers your bees are visiting right now, so customers really know were their honey is coming from. And have a price list easily visible that lists everything you have, at its price. Have five if you have a place.

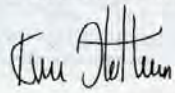
Other words of advice . . . arrive early, stay late, don't sit, put your business sign up high so everybody can see it, and not laying on the top of the table so nobody can see it, have lots of different kinds of product out on display. Have prices on everything so folks don't have to ask when they can't see your too-little signs. If you aren't renting a booth have a tent if you can, and have the table or counter deep inside the tent so folks can get in out of the sun and out of the walkway so they don't get run over when they are waiting to get waited on. If you have room, make a "U" or an "L" of your display instead of just a table with you in back. Get product up off the table top on stands or whatever . . . even empty boxes with paper over them are better than nothing. Put labels on top of your jars so people can see what it is without having to pick it up first, and put a back label on with additional info about you, your business, or the honey in the jar. Have business cards so people can find you even if they don't buy a jar because they might later. Got a homestand, make a map. Speaking of maps, why not have one showing where you are so they *know* you are local. That'll show that great big commercial gal two tents up who's got the best stuff.

•

Last month we ran an article by Tom Theobald on pesticides and the EPA. It generated a fair amount of interest, and heat, which was the intent. If you haven't, go back and read the article, or read it again. It's worth the time. But the following title of an imaginary article about the latest and silliest research out of India about colony collapse disorder also comes from Tom's fertile mind. His proposed title....

Wrong Number
Cell Phones and Honey Bees
Gotta love it. Thanks, Tom

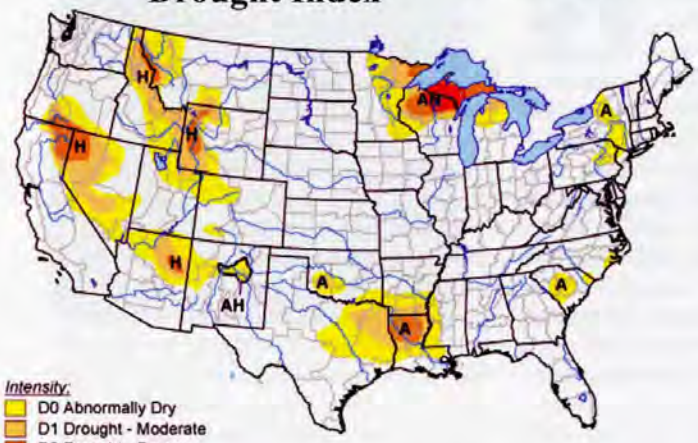
It's harvest time. Keep your smoker lit, your escape boards clear, your fume boards loaded, and your extractor ready. Mark my words, it's going to be a heck of a harvest this year.



AUGUST – REGIONAL HONEY PRICE REPORT

Drought Index

June 8, 2010



Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Weather & Crops

Too wet, too dry, too cold, too warm? These factors combined to produce good, or bad Spring and Summer crops, and contribute to how bees look right at the end of June. Take a look at your region to see how things stack up.

Overall, the Spring crop (1 = less than usual; 3 = better than usual) is below average at 1.78 but not by much. The Summer crop (1 = less; 3 = better than usual) isn't much better at 1.83 and is less than average. And how do bees look? They are (1 = terrible; 3 = what you'd expect; 5 = boomers) are just about what our reporters expected at 3.03 for this time of year. So, what will this season's crop bring? Stay tuned.

How has it bee so far where you are?

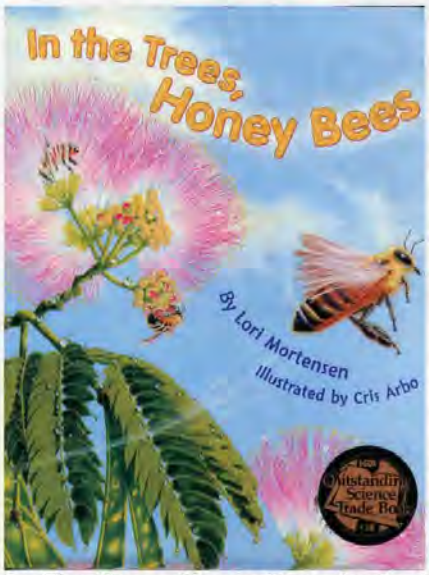
Region	Moisture Too wet - 1, Avg - 2 Too Dry - 3	Temperature Too Cold - 1, Avg - 2 Too Warm - 3	Spring Crop Bad - 1, Avg - 2 Good - 3	Summer Crop Bad - 1, Avg - 2 Good - 3	Bees Look Terrible - 1, Avg - 3 Boomers - 5
1	2.3	1.8	1.5	1.8	2.5
2	1.8	2.0	2.0	1.8	3.5
3	2.3	2.3	2.3	2.0	3.2
4	1.9	2.5	2.3	1.9	3.4
5	3.0	1.1	1.3	2.0	4.0
6	2.0	2.3	2.2	1.8	2.8
7	1.6	1.7	1.8	1.6	2.6
8	1.5	2.0	2.0	2.8	4.0
9	2.3	2.3	1.5	1.3	2.8
10	1.7	1.0	1.0	1.7	2.3
11	2.3	1.7	1.4	1.5	2.5
12	1.7	1.4	2.0	1.8	2.4

REPORTING REGIONS	1	2	3	4	5	6	7	8	9	10	11	12	SUMMARY Range	SUMMARY Avg.	History Last Month	History Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.61	1.85	1.61	1.49	1.55	1.64	1.75	1.61	1.80	1.75	1.57	1.59	1.49-1.85	1.65	1.63	1.54
55 Gal. Drum, Ambr	1.52	1.65	1.55	1.48	1.50	1.51	1.54	1.57	1.42	1.52	1.48	1.58	1.42-1.65	1.53	1.51	1.41
60# Light (retail)	131.50	126.33	133.00	133.33	130.00	140.00	144.00	135.00	150.00	142.48	154.00	151.67	126.33-154.00	139.28	135.13	134.63
60# Amber (retail)	130.00	119.00	130.00	127.00	120.00	128.75	128.00	132.50	117.50	136.71	148.33	155.82	117.50-155.82	131.13	126.78	127.41
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	55.20	61.98	45.60	56.50	66.97	50.75	40.00	66.97	66.97	48.00	47.50	70.00	40.00-70.00	56.37	58.81	55.96
1# 24/case	69.75	79.78	72.00	68.00	76.00	79.85	72.00	90.00	72.00	89.75	81.70	95.25	68.00-95.25	78.84	77.77	79.95
2# 12/case	73.80	83.92	66.60	63.50	69.00	74.01	67.40	81.00	69.50	81.00	66.25	85.00	63.50-85.00	73.41	70.29	69.10
12.oz. Plas. 24/cs	68.16	74.98	51.75	74.00	60.00	72.09	61.80	78.00	66.00	61.20	66.45	76.67	51.75-78.00	67.59	63.61	67.84
5# 6/case	92.22	83.99	78.00	73.50	84.00	83.31	72.00	99.00	72.00	85.20	62.75	88.50	62.75-99.00	81.21	80.12	79.42
Quarts 12/case	100.61	110.88	100.61	113.93	96.00	90.35	92.50	100.50	100.61	112.00	93.46	118.00	90.35-118.00	102.45	101.74	100.74
Pints 12/case	72.18	56.95	72.18	68.42	68.00	53.50	82.75	72.00	72.18	83.16	59.00	72.33	53.50-83.16	69.39	65.61	65.38
RETAIL SHELF PRICES																
1/2#	3.00	3.25	2.99	3.40	3.39	3.30	2.95	4.27	4.27	2.95	3.25	4.50	2.95-4.50	3.46	3.32	3.09
12 oz. Plastic	4.13	4.00	3.95	3.80	4.04	4.08	3.70	4.09	3.50	3.58	3.94	4.79	3.50-4.79	3.97	3.82	3.72
1# Glass/Plastic	4.10	4.44	4.63	4.56	5.94	5.88	5.04	5.19	4.50	4.96	5.43	6.75	4.10-6.75	5.12	4.94	4.56
2# Glass/Plastic	8.00	7.49	8.40	7.30	8.90	7.89	7.19	9.50	8.15	8.27	7.95	10.15	7.19-10.15	8.27	8.15	7.58
Pint	7.81	7.38	8.49	6.65	7.32	6.69	8.59	7.35	7.81	9.11	7.56	9.00	6.65-9.11	7.81	7.67	7.24
Quart	12.88	10.85	12.88	10.66	11.97	10.75	11.13	10.87	12.88	15.62	10.52	13.95	10.52-15.62	12.08	12.90	11.55
5# Glass/Plastic	17.00	16.25	20.45	17.33	21.18	17.83	21.68	19.00	18.00	16.51	18.88	20.50	16.25-21.68	18.72	19.09	17.61
1# Cream	18.92	5.86	6.50	5.82	18.92	5.00	4.70	6.39	5.95	5.55	6.32	6.50	4.70-18.92	8.04	6.42	5.61
1# Cut Comb	6.50	5.09	6.50	5.75	6.78	5.67	6.63	6.00	6.78	8.50	7.67	8.90	5.09-8.90	6.73	6.83	6.68
Ross Round	6.65	5.80	6.50	5.05	6.65	6.50	7.38	7.00	6.65	6.65	6.88	7.00	5.05-7.38	6.56	6.60	6.54
Wholesale Wax (Lt)	2.25	4.00	2.50	3.10	2.15	4.35	3.25	4.00	5.00	6.00	3.13	4.03	2.15-6.00	3.65	3.55	3.57
Wholesale Wax (Dk)	2.25	3.48	2.50	2.86	2.00	4.46	3.10	4.00	3.50	3.50	2.17	3.70	2.00-4.46	3.13	3.38	3.09
Pollination Fee/Col.	90.00	85.00	70.00	40.75	150.00	52.50	60.00	70.00	87.38	87.38	53.33	121.25	40.75-150.00	80.63	75.80	71.98

New For You —

Beetle Jail Jr., made by Millerbees Manufacturing in Jackson, TN, is an inhive, reusable small hive beetle trap made from recyclable polypropylene. It has a hinged lid so it can be opened, cleaned and reused.

The three compartments inside can be half filled with vegetable oil or bait or both. The trap comes with a clever hanging device so it can be hung from a frame while it fits between frames. It can be placed anywhere in the hive, preferably nearest to high populations of adult beetles. The frame can be removed from the hive with the trap attached, and if the trap is removed, it sits on its flat bottom. The trap costs $2.00, plus $1.00 shipping. Contact http://beetlejail.com/products-page/ to order, or beetlejail@gmail.com for more info.



In The Trees, Honey Bees, by Lori Mortensen, illustrated by Cris Arbo. ISBN 978-1-58469-114-3. Ages 4 – 10. Fully illustrated in color, 32 pages 9-1/2 x 11". $16.95 Dawn Publications, 12402 Bitney Springs Rd., Nevada City, CA 95959.

This award winning children's book about life in a honey bee colony is richly, and correctly illustrated, and the copy that goes with each of the often 2-page spread illustrations is short, lyrical, correct and to the point. This is an excellent book to introduce children to the colorful, and magic ways of a honey bee colony. A fact-filled section at the end, along with a list of references for more information finishes this very excellent book.

Betterbee Inc. announces a new 10-frame, bottom mounted rear opening Pollen Trap. After comparing various traps on the market Betterbee developed and tested a simpler design.

"We are pleased to release the product to the beekeeping public" says Justin Stevens, Executive Vice President at Betterbee, Inc. "All pollen traps on the market offer similar capabilities and the common thread among them is the high cost of the traps, and high cost of labor in cleaning the pollen. Lowering the initial investment was Betterbee's goal. The existing traps on the market are simply too expensive.

Popularized by the Ontario Agricultural College in 1965 and enhanced by changes made by Canadian beekeeper Vladimir Shaparew, pollen traps have existed in various forms for decades. One common theme was the cost of the trap. Betterbee now offers a simple trap that still has all the necessary features of a supberb pollen trap for a reasonable price. It simply is a better trap.

Betterbee is pleased to offer this better trap at a great introductory price. Call 800.632.3379 to order.

The Complete Idiot's Guide to Beekeeping. By Dean Stiglitz and Laurie Herboldsheimer. Published by Penguin Group. 7" x 9", 202 pgs. Black and white, soft cover. ISBN# 978-1-61564-011-9 $14.95.

I have avoided this series of books, on any subject, because, in my opinion, of the insulting nature of the titles published. Why anyone would want to be considered a complete idiot, and then admit to it by simply buying one of these books is beyond me. That's unfortunate for the authors of these books, who tend toward being helpful and literate, unlike the readers the publisher seems to want to attract. If you can get past the stigma of being considered an idiot you will find the information in this book helpful and enlightening. It is, without doubt the most persuasive advocate for using small cell, no treatment beekeeping techniques published so far. Not that this information isn't available, it's just that this book gives it greater exposure, and perhaps legitimacy . . . even if it is under that nasty title. Though well supported a part that troubles me is that it suggests beginning beekeepers transition their bees immediately from large cell to small cell . . . a not-impossible, but difficult task, undertaken at the same time a new beekeeper is just beginning to understand the ins and outs of beekeeping. Also, the authors' dismiss some problems that don't bother their bees that seems a short-coming when beekeepers in other parts of the country are confronted daily with pests such as small hive beetle. And, in spite of their claims, there are a multitude of books, extension bulletins and other resources available that practice their same approach . . . no treatment beekeeping. But that they too strongly advocate it is a plus for the book and for beekeeping.

a closer look

BALLING BEHAVIOR

Clarence Collison
Audrey Sheridan

Balling behavior is an efficient defensive mechanism of eliminating rival queens as well as colony intruders with limited disturbance to overall colony activities.

One mechanism of colony defense, termed balling, involves the actions of several to numerous workers who will form a tight mass around the body of an intruder. Balling can also be a means of queen elimination (Boch and Morse 1974). The addition of a new queen to the colony can result in workers attacking the introduced queen with the intent of killing her, especially if the old queen is present or if the new queen is released directly into the colony (Boch and Morse 1974, Robinson 1984). Pettis et al. (1995) found that balling behavior was most prominent in the Spring and Autumn. They usually form a cluster or ball around the queen consisting of 25 to 50 bees or more, each bee trying to injure her. This is usually started by one bee which seizes a leg or wing and attempts to sting her. Almost immediately other bees will join, and soon a tight ball of bees will be formed around the queen, all intent on doing her bodily harm. Balled queens frequently open their sting chambers, protruding their stingers and sting sheath. Balling workers are attracted to the sting sheath and lick it (Robinson 1984). Young bees do not participate in balling. The workers may protrude their stings slightly to release alarm pheromone to proclaim that she is a foreigner (Morse and Hooper 1985). Queens sometimes escape with their lives but may have a leg broken or a portion of a leg or antenna chewed off (Eckert and Shaw 1960).

Worker bee aggression towards introduced queens is a considerable obstacle to successful requeening. Beekeepers routinely cage new queens within the colony so that the worker bees can acclimatize to the new queen's odor, prior to her being released. Colonies or nuclei with virgin queens or newly introduced queens should not be manipulated, as undue excitement frequently causes bees to attack the queen. When colony inspections are made, young queens are more frequently balled than mature queens, but there are records of queens six months and a year old being balled. Balls of bees vary in their compactness, which may have to do with the queen's age (Morse and Hooper 1985).

Several pheromones have been proposed as the mechanism that initiates worker aggression towards foreign queens. Queens may produce 'stress' (Yadava and Smith 1971a, Lensky et al. 1991) or marking alarm pheromones (Ambrose 1975, Boch and Morse 1974). Numerous studies have demonstrated that the mandibular gland contents of queens can elicit aggressive behavior (Gary 1961, Walton and Smith 1970, Yadava and Smith 1971b). These studies involved removing glands from queens or coating workers with various amounts of whole gland extracts.

"Worker honey bees distinguish between their own and foreign queens on the basis of individual orders"

Yadava and Smith (1971a) postulated that queens produce a stress pheromone to explain the mechanism for worker aggression towards introduced queens. They described the following sequence of events following the introduction of a foreign queen. The queen is subjected to worker antennal examination which may be followed by threatening postures by the workers. The queen either responds by attempting to flee from the threatening workers or shows no response. If the queen moves away, some of the workers seize and even sting her, which may result in the queen's release of a stress pheromone from her mandibular glands. If the queen releases the stress pheromone, the worker attack intensifies and develops into "balling" and even the death of the queen. They also suggest that the threatening workers during

their initial examination of the queen release 2-heptanone, an alarm pheromone from their mandibular glands (Shearer and Boch 1965), which the queen detects with her antennal receptors. Ambrose (1975) challenged the validity of the stress pheromone hypothesis, since he found that dead queens introduced to queenright swarms which were subsequently dequeened, resulted in aggressive behavior toward the dead queens. The fact that they exhibited aggressive behavior towards these queens when they had not done so before being dequeened suggest that the loss of their queen might have changed their threshold of aggressiveness towards the foreign queens and something other than the stress pheromone triggered the aggression.

Pettis et al. (1998) explored the role of queen mandibular pheromone (QMP) in initiating balling behavior. Worker honey bees treated topically with a synthetic blend of QMP to the abdomen elicited aggressive balling behavior when re-introduced into their own colony. The size of balls formed around these workers increased with increasing dose of QMP, and increasing dose resulted in shorter time to ball formation. When the QMP dose was below that normally found on a queen, 10^{-3} queen equivalents, it resulted in significantly slower ball formation and smaller ball diameter. The acid components of the five-component QMP elicited balling behavior while the aromatic components did not, but the full blend elicited the strongest response. Stinging behavior was the most prevalent and persistent factor preceding the formation of balls. It is believed that a 'marking' pheromone is released when an aggressive worker flexes her abdomen, and that the release of this pheromone causes ball formation. There were no obvious changes in resident queen behavior while balling of QMP-treated workers was occurring. They concluded that queen mandibular gland pheromone is a significant signal in foreign queen recognition and the initiation of balling behavior. Ball persistence is likely maintained by the release of queen mandibular gland pheromone during the balling process (Pettis et al. 1998).

A swarm of honey bees which has lost its queen is capable of finding and rejoining her in a short period of time. When given a choice, workers in a swarm prefer their own to a foreign queen. Accurate discrimination is contingent upon antennal and/or proboscal contact with both queens. Such discrimination appears to be based on the perception of small differences in hive odors. Hive odors are persistent substances which are adsorbed to the body surfaces of the queens. Upon finding and recognizing their own queen, the workers feed her and disperse Nassanoff pheromone, thus attracting other searchers. Upon finding and identifying a foreign queen, the workers react aggressively towards her, and signal her rejection by 'marking' her with alarm pheromones (Boch and Morse 1974).

"Workers who participated in balling of the pseudoqueen displayed aggressive behavior, such as grasping and biting of the wings and hind legs, as well as pulling."

Topical treatment of worker bees ("pseudoqueens") with ethanol extracts of queen Koschewnikow glands (QKG) induced typical queen balling behavior in workers of a bee colony (Lensky et al. 1991). Since the workers used as pseudoqueens were removed from and introduced into their own colonies, the effect of a foreign colony odor was eliminated, which could have been responsible for aggressive behavior towards an introduced worker or queen. Each introduced worker pseudoqueen was immediately surrounded by hive bees, who formed a dense ball around her, consisting of about 15-35 workers. The "ball" around the pseudoqueen persisted for five to 10 minutes, after which about two workers remained. Approximately four minutes later, they abandoned the pseudoqueen. Workers who participated in balling of the pseudoqueen displayed aggressive behavior, such as grasping and biting of the wings and hind legs, as well as pulling. They also observed non-aggressive behavior of workers participating in the ball, such as antennating and licking. When the balling was terminated, the pseudoqueens could move

around, but in most cases their wings were damaged. They observed several violent and non-violent activities towards the pseudoqueens treated with QKG extracts, as described in the case of balled queens (Yadava and Smith 1971c, Robinson 1984). The onset of balling of a pseudoqueen covered with QKG extract would occur almost immediately following her introduction into an observation hive, whereas it took about 8.5 minutes for the behavior to begin toward a foreign queen, as reported by Robinson (1984). The relative short balling duration of pseudoqueens (seven minutes) as compared to that of an intact queen (58 minutes, Robinson 1984) was believed to be due to the rapid evaporation rate of ethanol extracts from the body surface of a worker versus continued secretion from the gland and its release from the setaceous membrane in the queen bee.

Balling behavior is an efficient defensive mechanism of eliminating rival queens as well as colony intruders with limited disturbance to overall colony activities (Pettis et al. 1998). Numerous factors, both intrinsic and extrinsic, influence colony balling behavior. Worker honey bees distinguish between their own and foreign queens on the basis of individual odors. Recognition odors of queens are in part genetically determined, in part acquired from the food supply and hive environment and by the pheromones she produces from various glands to communicate her presence. Several queen and worker pheromones appear to be responsible for initiating balling behavior. BC

References

Ambrose, J.T. 1975. *Aggressive behaviour of honeybee workers towards foreign queens and an inconsistency with the stress-pheromone hypothesis.* Canad. J. Zool. 53: 69-71.

Boch, R. and R.A. Morse 1974. *Discrimination of familiar and foreign queens by honey bee swarms.* Ann. Entomol. Soc. Am. 67: 709-711.

Eckert, J.E. and F.R. Shaw 1960. *Beekeeping.* Macmillan Co., New York, 536 pp.

Gary, N.E. 1961. *Antagonistic reactions of worker honey bees to the mandibular gland contents of the queen* (Apis mellifera *L.*). Bee World 42: 14-17.

Lensky, Y., P. Cassier, S. Rosa and D. Grandperrin 1991. *Induction of balling in worker honey bees* (Apis mellifera *L.) by 'stress' pheromone from Koschewnikow glands of queen bees: behavioural, structural, and chemical study.* Comp. Biochem. Physiol. A 100:585-594.

Morse, R. and T. Hooper 1985. *Balling, In The Illustrated Encyclopedia Of Beekeeping.* pp. 35-36. Edited by R. Morse and T. Hooper. E. P. Dutton, Inc. New York, NY.

Pettis, J.S., L.C. Westcott and M.L. Winston 1998. *Balling behaviour in the honey bee in response to exogenous queen mandibular gland pheromone.* J. Apic. Res. 37: 125-131.

Pettis, J.S., M.L. Winston and K.N. Slessor 1995. *Behavior of queen and worker honey bees (Hymenoptera: Apidae) in response to exogenous queen mandibular pheromone.* Ann. Entomol. Soc. Am. 88: 580-588.

Robinson, G.E. 1984. *Worker and queen honey bee behavior during foreign queen introduction.* Insectes Sociaux 31: 254-263.

Shearer, D.A. and R. Boch 1965. *2-Heptanone in the mandibular gland secretion of the honey bee.* Nature (Lond.) 206: 530.

Walton, G.M. and M.V. Smith 1970. *Effect of mandibular gland extirpation on acceptance of the queen honey bee.* J. Econ. Entomol. 63: 714-715.

Yadava, R.R.S. and M.V. Smith 1971a. *Aggressive behavior of Apis mellifera L. workers towards introduced queens. 1.Behavioral mechanisms involved in the release of worker aggression.* Behavior 39: 212-236.

Yadava, R.R.S. and M.V. Smith 1971b. *Aggressive behavior of Apis mellifera L. workers towards introduced queens II. Role of mandibular gland contents of the queen in releasing aggressive behavior.* Cand. J. Zool. 49: 1179-1183.

Yadava, R.R. S. and M.V. Smith 1971c. *Aggressive behavior of Apis mellifera L. workers towards introduced queens III. Relationship between the attractiveness of the queen and worker aggression.* Can. J. Zool. 49: 1359-1362.

Clarence Collison is a Professor of Entomology and Head of the Department of Entomology and Plant Pathology and Audrey Sheridan is a Research Technician at Mississippi State University, Mississippi State, MS.

Calculating Growth

Measuring Growth & Decline

How many bees are in that box? It pays to know.

J. Lloyd Harris

Introduction: There are several ways to start a colony. It can be a started as a continuation of an existing colony from the previous year. It can be started as a nucleus colony formed from a portion of an existing colony's adult population along with brood and a queen. It can be started as a "package" colony formed from "x" pounds of adult workers and a queen without any brood. All colonies essentially are an extension of one of the three basic colony types. Even a two-queen colony is just a special case of the basic three types. A two-queen colony is just two standard colonies, which has been mechanically separated by a queen excluder to keep the two queens from killing each other.

The purpose of this paper is to enable to reader to be able to study and document the development of his/her colonies under localized conditions. This article is an extension of and a slightly more complex version of the previous article on determining the amount of brood required to maintain a colony at its equilibrium point.

Methods: The spreadsheet used to perform the calculations was based on the logic used in the honey bee population model developed by Harris (1985). This population model treats the colony as being composed of two separate groups of bees. The first group is the worker population at the beginning of the experiment. The second group of bees is the bees reared by the colony after the experiment began. Both groups of bees are composed of sub-populations of bees belonging to different age classes (0 –12, >12 –24, etc).

The initial population of worker bees can be estimated from the odds *ratio of* the weight of the colony's adult populations and the weight of a known number of bees. Subsequent estimates of the size of the initiating colony can be determined from the survivorship of marked worker bees introduced into the colony when the experiment began. The initial population can also be estimated using the same techniques used to estimate the bees reared by the colony, but this requires either an understanding of how the parent colony had been developing and how these adults will die.

The colony's developing population is estimated from seasonal sealed brood estimates taken at regular 12-day segments throughout the Summer. Each 12-day sealed brood segment is treated as a unique sub-population. The demise of each sub-population is estimated either from marked worker bees introduced into the colony when the sealed brood was measured or from a standardized honey bee life table. The colony's adult population is then calculated by adding the estimated proportion of each sub-population alive on specific dates.

The Harris Population Model procedure has recently been converted from a computer program written in Fortran to a spreadsheet application (Harris & Harris, unpublished). The basic spreadsheet can be uploaded from the Department of Entomology, University of Manitoba website.*

Part 1 of this article described the use of a spreadsheet workbook that gave and received information from two other workbooks to calculate the amount of brood the colony would have to produce every twelfth day during the season to maintain its worker population at some fixed value.

This spreadsheet example is a slightly more complex version of the "Colony Equilibrium" worksheet. Rather than remotely entering and extracting information from the worksheets where the calculations were actually preformed, this example works directly with the workbooks where the calculations were actually preformed.

The Master Colony workbook may be a bit intimidating to a first-time-user with all its colored rows and columns of data. To minimize the confusion, the data that were not being changed in this example have been grayed-out or entire rows of data in the Master Colony workbook has been hidden from view.

The contents of the cells in Section 1 can be made visible by selecting them and changing the font color to black. The hidden rows in Section three can be made visible by selecting Rows 29 and Row 43, right clicking the "mouse" and selecting "Unhide "from the drop-down menu.

The underlying workbooks required seasonal sealed brood production data on a repetitive 12-day cycle as well as worker bee survival estimates for each sub-population after it emerged from the sealed brood stage on a repetitive 12-day cycle. In Part 1 of this article, the Colony Equilibrium workbook set the sealed brood estimates to single number and the worker bee sub-population survival curves were set to a series of declining values. These same numbers should be immediately evident when you first

*http://www.umanitoba.ca/afs/entomology/links.html and selecting and saving "Honey Bee Colony Equilibrium Estimation Procedures".

Section #1 - Brood Estimates											
Date	Eggs			Larvae 6		Sealed Brood					Adults
	Per Day	Total Cells	% Survival	Total Cells	% Survival	Area	Cells/Area	Modifer #1	Total Cells	Survival	Emerging
04-Mar-21	505	1515	85.0%	2849	90.4%	0	27.75	1	0	98.8%	
16-Mar-21	1091	3272	85.0%	6154	90.4%	186	27.75	1	5151	98.8%	0
28-Mar-21	1383	4150	85.0%	7805	90.4%	401	27.75	1	11126	98.8%	5089
09-Apr-21	1514	4541	85.0%	8539	90.4%	508	27.75	1	14111	98.8%	10993
21-Apr-21	1514	4543	85.0%	8543	90.4%	556	27.75	1	15439	98.8%	13941
03-May-21	1774	5323	85.0%	10010	90.4%	557	27.75	1	15445	98.8%	15254
15-May-21	1461	4383	85.0%	8241	90.4%	652	27.75	1	18098	98.8%	15260
27-May-21	1308	3925	85.0%	7380	90.4%	537	27.75	1	14901	98.8%	17880
08-Jun-21	1308	3925	85.0%	7380	90.4%	481	27.75	1	13344	98.8%	14722
etc, etc.	~	~	85.0%	~	90.4%	481	27.75	1	13344	98.8%	13184

Enter sealed brood estimates at twelve day intervals.

view the data on the Master Colony workbook tab. The sealed brood data is arranged and initially stored as a series of identical numbers in Section 1, as are the worker survival data arranged and stored in Section 2.

Results: The results of all the calculations preformed by the workbooks are formatted and stored in Section 4 of the Master Colony worksheet (see table 1).

Brood estimates are contained in Row 47: Row 49 of Section 4, Table 1. The number of bees belonging to the various age classes in the colony is contained in Row 50 through Row 58. The red numbers in a triangular-shaped area in the lower left-hand portion of Section 4 of the Master Colony workbook (Rows 50 through Row 58) represent the bees originating from the parent colony. The black numbers in the upper right-hand triangular area of Rows 50 through Row 58 represent the adult worker bees produced by the developing colony. The colony's age distribution on various dates are grouped in the respective columns below the specific dates in Row 46. The colony age distributions can be graphed to give an overall shape to the colony's population (Harris, 2008a, 2008b, 2009, 2010). The contribution to the total population from the initiating colony and the developing colony are displayed in Section 4, Rows 59 and Row 60, respectively. The colony's total adult population is summed in Row 61.

The highlighted cells of the same color allow the user to follow the decline of each sub-population of workers and to know how large each sub-population is and when it ceases to be part of the colony.

Discussion: The population equilibrium example in Part 1 of this article is not very representative of the real world. Its main objective was to determine how many bees a colony must produce to have a stable population and to introduce the user to the concepts of "birth" and death in a honey bee colony and their effects on colony development without having to view the complexity of the underlying data sheets.

The following is an extension of the Colony Equilibrium workbook. It expands the spreadsheet to allow the user to vary the sealed brood estimates and the survival of these bees every 12th day during the Summer.

Entering new data in these cells in the Master Colony workbook will overwrite formula contained in these cell used by the Colony equilibrium workbook and severs the relationships established between the two workbooks. So if you want to retain the previous material you should save the spreadsheet under a different file name now. Alternatively, you can upload the modified spreadsheet with all the formula already changed and ready for you to enter your data (**find these workbooks at www.beeculture.com**).

The Spreadsheet Workbooks: There are several workbooks within this spreadsheet. The workbooks on the tabs labeled "Master Colony" and "Initial Colony" are where all the calculations were actually preformed in Part 1 of this article. The workbook labeled "Interpolated Sealed Brood" workbook is only used when the 12-day sealed brood estimates are not directly accessible because the 12-day cycle sealed brood estimation cycle was not adhered to. When this happens, the 12-day sealed brood estimates should be calculated within this workbook and then pasted back into the Master Colony workbook as pasted links.

Initiating Colony Workbook: The initial size and age structure of the initiating honey bee colony along with its demise are calculated within the "Initial Colony" workbook and then transferred to the Master Colony workbook as pasted links. The format of the Initial Colony workbook is almost identical to that of the Master Colony workbook except it contains

Section #2... contains census data collected for cohorts of marked bees or survivorship data from life tables collected at 12-day intervals.

Section #2 - Marked Bee Census Data								% Longevity Adjustment		5	
Date	0 days	12 days	24 days	36 days	48 days	60 days	72 days	84 days	96 days	0	Average
Initial Colony	135	105	75	12	13	12	5	1	0		
04-Mar-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
16-Mar-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
28-Mar-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
09-Apr-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
21-Apr-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
03-May-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
15-May-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
27-May-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
08-Jun-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
20-Jun-21	9627	9169	7306	4895	2065	534	68	6	0	0	35.91
etc, etc.											

Enter # of workers randonly marked at the start of the experiment and every 12 days thereafter in this Row.

Section #3 - Life Table/Surivorship Data (L_x)										
Date	0 days	12 days	24 days	36 days	48 days	60 days	72 days	84 days	96 days	Etc.
04-Mar-21	1.000	0.976	0.8556	0.6337	0.3615	0.13498	0.0313	0.0038	0.0003	0.0000
16-Mar-21	1.000	0.976	0.8556	0.6337	0.3615	0.13498	0.0313	0.0038	0.0003	0.0000
28-Mar-21	1.000	0.976	0.8556	0.6337	0.3615	0.13498	0.0313	0.0038	0.0003	0.0000
09-Apr-21	1.000	0.976	0.8556	0.6337	0.3615	0.13498	0.0313	0.0038	0.0003	0.0000
21-Apr-21	1.000	0.976	0.8556	0.6337	0.3615	0.13498	0.0313	0.0038	0.0003	0.0000
03-May-21	1.000	0.976	0.8556	0.6337	0.3615	0.1350	0.0313	0.0038	0.0003	0.0000
15-May-21	1.000	0.976	0.8556	0.6337	0.3615	0.13498	0.0313	0.0038	0.0003	0.0000
27-May-21	1.000	0.976	0.8556	0.6337	0.3615	0.13498	0.0313	0.0038	0.0003	0.0000
08-Jun-21	1.000	0.976	0.8556	0.6337	0.3615	0.13498	0.0313	0.0038	0.0003	0.0000
20-Jun-21	1.000	0.976	0.8556	0.6337	0.3615	0.13498	0.0313	0.0038	0.0003	0.0000
etc, etc.	Mean									

The information in this section is calculated fron the information in section #2. Do not enter data into this section of the spreadsheet.

an additional section where the numbers of workers belonging to various age classes are calculated based on the number of bees that were used to start the daughter colony. The inner working of this worksheet will not be addressed directly.

The initiating colony represents a hypothetical colony or the actual parent colony before it was used to produce a daughter colony used in the Master Colony workbook. The demise of the initiating colony is based on the worker bee survival data contained in the Initial Colony workbook. These survival estimates can be the same or different from those for the developing colony.

In Part I of this article, there was a relationship established between the size of the initial colony in the Colony Equilibrium workbook and the size of the initiating colony in the Initiating Colony workbook. It will be more convenient now if this relationship is severed and the relationship is restructured so that the relationship is between Cell C59 of the Master Colony workbook and Cell K81 of the Initiating Colony. The contents of Cell B59 in the Master Colony workbook should be copied and pasted into Cell K81 of the Initiating Colony workbook using the Paste Link feature in the Paste Special dialogue box, which can be assessed from the Edit drop-down menu off of the main toolbar's menu.

Master Colony Workbook: The master colony workbook contains the data and the related mathematical formulae necessary to calculate the development of the developing colony at regular 12-day intervals. It also contains estimates for the initiating colony and its demise that were calculated within and transferred from the Initial Colony workbook.

There are four data sections in the Master Colony workbook each containing arrays of data. Section 1 contains the sealed brood estimates and the dates on which they were measured. Most of the data in Section 1 has been grayed-out and can be ignored but the cell contents should not be tampered with until you become more familiar with the workbooks. Section 2 contains survival estimates for cohorts of marked worker bees that were used to calculate the survival of the bees that will emerge from the various sub-population of sealed brood. Section 3 has been hidden because the spreadsheet user never directly accesses its contents. Section 4 contains all the colony's population estimates and its age distributions (see Table 1).

Sealed Brood Estimates: The model divides the colony's seasonal sealed brood curve into a number of segments each lasting for 12 days. Because this is also the duration of the sealed brood stage, dividing the seasonal brood curve into 12-day segments ensures that individual bees are not counted twice nor are they overlooked.

The sealed brood array in Column G of the Section 1 of the Master Colony workbook expands the single sealed brood estimate in the Colony Equilibrium workbook example into a series of sealed brood estimates. This allows for a series of different sealed brood estimates, which more closely mimics what is likely to happen within a colony.

Initially, when you view Section 1, Column G of the Master Colony workbook, it will contain a series of sealed brood area estimates that are identical. This data is left over from when the model was used to calculate the amount of sealed brood needed to produce a colony at equilibrium. In the real world, this would be extremely unlikely that sealed brood production would be constant throughout the year. In a real situation, the sealed brood estimates taken at 12-day intervals throughout the summer are all likely to quite variable. After all, brood production is a function of: colony size, pollen availability, nectar availability, local weather conditions, etc which are also constantly changing.

Worker Longevity Estimates: Section 2 of the Master Colony workbook provides for estimates of worker longevity for each group of bees previously measured as sealed brood. The cells containing each date and sealed brood estimate are color-coded to match the colors that emerging worker bees will be marked.

As with the sealed brood area estimates in Section 1 of the Master Colony workbook, each row in Section 2 initially contains the worker bee survival estimates used in the Part 1. These estimates can be altered or replaced with new data. The data in Section 2 of this workbook can be replaced with observations on the survival of newly emerged cohorts of marked worker bees observed locally. This data can be entered into the workbook either as the observed numbers of marked bees (integers format) or average percent survival (decimal format). Alternatively, the user can use worker bee survival data from a published life table survival data if they are deemed to be representative of what might occur locally. Entering new data in Section 2 will overwrite the formulae linking the cells with the data in the Colony Equilibrium Workbook.

Colony Population Estimates: The average sub-population survival estimates for each sub-population of worker bees are calculated by formula in the spreadsheet and placed into Section 4 of the Master Colony workbook. The data along with the formulae contained in these cells should not be altered. These data are derived from the sealed brood area estimates ("birth rates") in Section 1 and the death rates in Section 2.

Working with the Model: Now you should be ready to use the model. Suppose you start an experiment on

Section #4 - Total Worker Population by Age Class										
	Date									
	04-Mar-21	16-Mar-21	28-Mar-21	09-Apr-21	21-Apr-21	03-May-21	15-May-21	27-May-21	08-Jun-21	20-Jun-21
eggs	1515	3272	4150	4541	4543	5323	4383	3925	3925	#REF!
larvae	2849	6154	7805	8539	8543	10010	8241	7380	7380	#REF!
pupae	0	5151	11126	14111	15439	15445	18098	14901	13344	13344
> 0 - 12	**2629**	0	4968	10731	13609	14891	14897	17455	14371	12870
>12 - 24	**1969**	**2250**	0	4251	9182	11645	12741	12746	14935	12296
>24 - 36	**1380**	**1458**	**1666**	0	3148	6800	8624	9436	9439	11060
>36 - 48	**740**	**787**	**832**	**950**	0	1796	3879	4919	5383	5385
>48 - 60	**234**	**276**	**294**	**311**	**355**	0	671	1448	1837	2010
>60 - 72	**43**	**54**	**64**	**68**	**72**	**82**	0	155	336	425
>72 - 84	**5**	**5**	**7**	**8**	**8**	**9**	**10**	0	19	41
>84 - 96	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**0.8**	0	2
>96 - 108	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		0
Initial Colony	**7000**	**4831**	**2863**	**1337**	**436**	**92**	**11**	**0.8**	**0**	
Initial Colony	**7000**	**5444**	**3889**	**622**	**574**	**622**	**259**	**51.9**	**0**	
Total workers	**7,000**	**4,831**	**7,831**	**16,320**	**26,375**	**35,223**	**40,822**	**46,161**	**46,319**	**44,089**

4 April 2010 using a two-pound package of worker bees and a mated queen and want to follow its development throughout the Summer.

The first step in the process would be to enter the date (4 April 2010) in Section 1, Cell A4 of the Master Colony workbook. Placing the start date in Cell A4 will determine the dates that all subsequent sealed brood estimates should be taken.

The second step requires you to enter an estimate of the initial colony size into Section 4, Cell B59. An acceptable initial population estimate for a two-pound package of worker bees would be about 7000 bees. Entering this estimate into Cell B59 produces a series of colony age structure estimates for the initiating colony until the package bees have been deemed to have all died. The age structure estimates and the demise of the package bees are based on the information contained in the Initiating Colony workbook.

The third step in the process is to measure the amount of sealed brood (in square inches) in the colony. Unless you add sealed brood from another colony, the sealed brood measurement entered for the package bee colony initiated on 4 April will be zero.

The fourth step in the process is to mark a series of newly emerged bees with number tags or a spots of colored paint on the top of their thorax so that the number of bees in this sub-population can be estimated after they emerge and until all these bees have died. For a package colony without any sealed brood added to it when it was hived, this step is omitted during the first data collection cycle.

The fifth step in the process requires you to determine how many of the marked bees were successfully introduced into the colony. Some researches have estimated this by counting the marked bees one day after they were marked while others have waited up to a week or more before deciding how many bees were successfully introduced into the colony.

The sixth step requires you to wait 12 days and estimate the number of marked bees that remain in the colony on 16 April. This needs to be done before the bees start leaving the colony in the morning or in the evening after they have all returned to the colony.

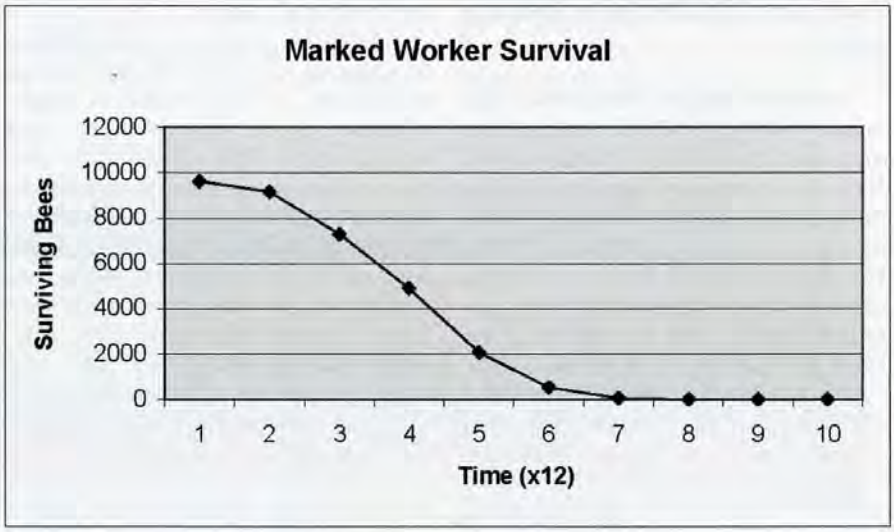
The data being collected in step four through step six is used to produce worker bee survival estimates. In-colony survival data is not required by the spreadsheet but it is preferred. Worker survival data from published life tables can be used if an appropriate set of life tables is available. Alternatively the default worker bee survival data values can be altered visually using the Graphical Goal Seeking (not available in Excel 2007) previously discussed in Part I of this article in which case Step five and Step six can be omitted. Omitting these three steps is not recommended.

Steps three through step six are then repeated every 12th day throughout the Summer and the collected data entered into the Master Colony workbook.

Every time the sealed brood is estimated and entered into the Master Colony workbook, the spreadsheet calculates how many bees will be in the colony 12 days hence.

Section four on the Master Colony workbook contains estimates of the number of bees in the colony by their age class. If you what to know when the bees that emerged on a specific date have all died, just follow cells in a step-wise sequence until these cells no longer contains any bees. This is an important consideration if you what to known when the workers forming the winter colony were produced or if the bees emerging on a specific date will be in the colony when they are needed for crop pollination.

Changes in size of the colony's population during the season can be



graphed as a line chart or bar chart using the graphing features in the spreadsheet software.

Theoretical estimates: If the user wants to theorize about what might happen to the colony's population if there were changes in the colonies "birth" rate or its death rates as a result of some management practice or other event this can be done by changing the sealed brood estimates or the worker longevity estimates using the "Graphical Goal Seeking" features in the software.

The easiest way to visualize these comparisons is to copy and paste the population estimates from Row 61 into Row 64 as **values** using the Paste Special option on the Edit drop-down menu from the menu toolbar before making any changes. Then make your hypothetical changes to the data in Section one or Section two.

Once the changes had been made to the sealed brood estimates and worker bee survival estimates the spreadsheet displays the new estimates in the last row of Section four and Row 65. These new estimates along with the previous estimates (the paste special estimates) can be graphed using the graphic software in the spreadsheet program.

For example: A 10 percent increase in sealed brood production during the season in a colony where the average worker bee lived 35.52 day and had constant brood production of approximately 188 square inches will result in approximately 957 more bees in the colony over time (Figure 1). Most of this increase will be realized within 36 to 48 days because the additions are additive.

Conclusions: The Harris Spreadsheet Population Model is a "user friendly" version of the Harris Honey Bee Population Model (Harris 1985). The spreadsheet version of the model provides the Harris Population Model in a format that can be used and modified using software that is readily available on most personal computers. It allows a beekeeper to follow and document changes in a colony by just measuring sealed brood and monitoring the demise of marked workers in a colony.

It is hoped that individual beekeepers or groups of beekeepers would use this spreadsheet population model to investigate different aspects of colony development and share their finding with other beekeepers. BC

J. Lloyd Harris is a crop consultant, and former honey bee researcher living in Regina, Saskatchewan, Canada S4S 1G6. You can reach him at ***lharris@agview.sasktelmail.com.***

References:

Harris, J.L. (1985) *A model of honey bee colony population dynamics.* Journal of Apiculture Research 24: 228–236.

Harris, J.L. (2008a) *Development of honey bee colonies initiated from package bees on the Northern Great Plains of North America.* Journal of Apiculture Research 47: 141–50.

Harris, J.L. (2008b) *Effect of requeening on fall populations of honey bees on the northern Great Plains of North America.* Journal of Apicultural Research *47(4): 271–280.*

Harris, J.L. (2009) *Development of honey bee colonies in the northern Great Plains of North America during confinement to winter quarters.* Journal of Apicultural Research 48(2): 85–90.

Harris, J.L. (2010) *Effect of Requeening in late July on honey bee colony development on the northern Great Plains of North America after removal from an indoor winter storage facility.* Journal of Apicultural Research.

Managed Pollinator CAP
Coordinated Agricultural Project

A View From The Front Line

Kerry Lynott

There are many days when I wish my laboratory was as organized as a honey bee hive. If only my routine were dictated by a delicate bouquet of chemical signals rather than a series of list-serve emails and dense protocols. Imagine a staff whose patterns were linked by a superorganism mind set receiving instructions with one interpretation and a common goal. We could rise above the petty disputes over smelly boots left in the field truck or whose turn it is to count frames of bees and simply function. Collecting data would be perfectly uniform and natural.

However, this level of intuitive collaboration would put me and my fellow research technicians out of jobs. It is because we are clumsy, conflicted humans that the job of the research technician is so critical.

Whether it's wiring electrical circuits, plumbing the guts of ultra-low freezers, or fixing geriatric trucks, the daily jobs of a successful research technician describe a true "Renaissance" person. Though we are at the bottom of the research project "totem pole," we are frequently the front lines standing between the success or failure of a project. We take instructions from the top, supervise the bottom, and work feverishly to bridge the gap between the ideal in the mind of the primary investigators and the practical out in the real world.

Our true gift, though, is in managing the organized chaos otherwise known as field research. In this month's installment of the Managed Pollinator CAP Update, we pause from examining the science behind the CAP and instead focus on the art of managing a massive, multi-state field project. This article seeks to provide the reader with an insight into the one of the biggest initiatives of the CAP – the Stationary Apiary Monitoring Scheme – from the viewpoint of, if you would, its "worker bees," the Research Technicians, Graduate Students, and Undergraduate Students who make it all happen.

The goal of the stationary apiary project is to monitor all of the possible variables affecting the survivorship of the colonies. This is a great idea in theory, but the practice of that level of data collection on thirty colonies in seven states is intense. So a group of some of the most brilliant minds in honey bee research came together to discuss how this would be accomplished. They wrote protocols for every variable to be analyzed. Their work was detailed and exacting, but still incomplete. The various persons charged with completing the tasks will interpret even the most exhaustive protocol slightly differently. There is also no guarantee that the protocols will work effectively in the field when applied to the project at hand. Now multiply this problem by seven states and seven teams of researchers; this is the Stationary Apiary CAP.

This kind of differing interpretation is a serious problem when trying to collect standardized data in a major, multi-state, multimillion-dollar research project. The confusion escalates as a fluctuating group of summer undergraduate workers are taught the protocol in a "whisper down the alley" style. Finally, it is nearly impossible to predict what will be the most effective protocol for a given project without doing test runs, which take additional time and money.

This is where the research technicians step in and earn their keep. As members of the Stationary Apiary project, we are familiar with the protocols and work with the primary researchers and other research technicians across the country to standardize our work and our staff. We also work to write "mini" protocols that fill in the unforeseen gaps between instructions. For example, it was hard to predict what the best method for collecting various castes of bees would be for each research team. Therefore, the individual research technicians were responsible for responding to this issue and leading their staff. Most importantly though, we figure out what works for our data collection and what does not. This allows us to mold the protocol over time into its most effective and efficient form. As we face our second Summer of the Stationary Apiary CAP, we can reflect back on the myriad challenges overcome during our first season. What follows are a few examples of how the Penn State University research team worked to do just that.

The Stationary Apiary project can be broken down into two main technical components: the fieldwork and data collection done in seven apiaries around the country, and the molecular and diagnostic data collection done in the lab. Many of my days are spent in the lab running honey bee samples and analyzing their molecular components from which some of our most frustrating issues have arisen.

In order to give outsiders an idea of project scale, I explain to them the number of samples that pass through my hands during our peak beekeeping season from April through September. From seven apiaries around the country, a maximum number of 30 hives are sampled each month. Each hive has five different honey bee samples taken of which four are delivered to the Penn State laboratory. Over a six-month period I could inventory a maximum of 5,040 honey bee samples. These samples are not, by the way, space-efficient as they arrive in 50-milliliter tubes jammed inside a Ziploc bag. To make matters more insane, the samples can never thaw to a temperature higher than -80°C (-112°F). This means that the samples must be shipped on dry ice and upon arrival be immediately stored in one of our laboratory's ultralow freezers. The process of shipping and receiving Stationary Apiary Project samples is relatively cut and dried until you factor in ultralow freezer space.

In molecular laboratories around the world, the value of ultralow freezer space is reckoned somewhere near an original Renoir or Van Gogh. I have seen distraught graduate students wandering the halls of our department begging for a drawer in someone's – anyone's – ultralow freezer. As the Stationary Apiary samples began arriving last Summer, it became immediately apparent that we were out of space. Fifteen thousand dollars and much grinding of teeth later, we had a second ultralow freezer. One month later this freezer, too, was full to bursting. My undergraduate team became adept at stuffing something in the freezer and slamming the door shut before anything could fall out. Thankfully, no fingers were lost in the process.

We were back at square one and I was having nightmares in which, when I arrived at work the mailroom was filled with samples for me to stuff into non-existent freezer space. In order to maintain at least a façade of sanity, I devised a plan to "archive" the samples thus taking up much less space in the freezer. I could grind the frozen bees into pooled samples and store them in smaller tubes – tubes that fit neatly into an easily accessible box. To my absolute astonishment, it worked. I began to see my freezer compartments closing with ease, missing that threatening bulge. There are many, many more samples to archive, but the promise of freezer space drives me forward. Perhaps we will have so much extra space that the whole four years of the Stationary Apiary Project will fit into the two ultralow freezers we have and I will not have to deal with obnoxious freezer sales people ever again! Probably not – but a girl can dream.

Moving over to the field data collection, one of the factors we are analyzing includes the pollen bees bring back to the hive. This seems entirely reasonable, as the pollen is the bees' protein source. We should know if the pollen our bees are consuming is laden with pesticides or other foul substances. So how hard could pollen collection be? Lots of beekeepers do it. It turns out that pollen is one of the most challenging substances to move from one place to another. Those perfect little pollen balls crumble if you touch them incorrectly, and if the pollen gets even slightly wet you end up with slimy pollen mess over everything. So our beekeeper and technician Jeremy devised a contraption to get the pollen out of the pollen traps and into the sample collection tubes without destroying the pollen's structural integrity or his patience. Presenting the "water bottle pollen funnel!" By taking an average plastic water bottle, cutting out the bottom, and duct taping it to a wide mouth funnel you have the perfect size opening to pour pollen into a sample tube. Simply take the pollen trap basket, pour the pollen into the funnel on top, and collect the pollen pieces in a sample tube held under the mouth of the water bottle! Of course! The reality of this process was not as simple as it may seem in writing. This mini-protocol took months, three to be exact. Three months of botched pollen sampling and disheartened looks. We got there, though, and no undergraduates were harmed in the process.

We were further instructed to collect adult worker bees in sample tubes with 95% ethanol for tracheal mite and *Nosema* load analysis. Our team has done this many times and so felt that no additional protocol brainstorming was necessary. I have discovered in my short time as a research technician that this feeling of security with a new protocol should not be trusted. I now always assume that a micro protocol is necessary. Because as

it turns out, ethanol leaks out of our expensive sample tubes when they are shaken up in the mailing process, thus rendering any "permanent marker" tube labeling useless. So I purchased parafilm, a stretchy plastic-like material, to seal the tubes before I mailed the second batch. Again, I was foiled by the low viscosity of ethanol and my tubes arrived without labels. No more messing around; I purchased $55 worth of ethanol-proof, laboratory grade markers. The third round of tubes were labeled, wrapped in parafilm, and put in separate Ziploc Baggies. Our samples arrived intact with clear labels. During our monthly conference call with the other Stationary CAPs participants, I proudly announced that I had found a solution to our labeling problem. There was silence as I explained the details until someone asked, "Why didn't you just write the information in pencil on a piece of paper and put it inside the tube. Ethanol doesn't remove pencil." Lesson: Someone else will always have a better solution than you do. Make sure you ask.

Then, as we entered Spring and temperatures began to warm, we made our hardest discovery during our first year on this project. One colony, one colony out of thirty brand new colonies, survived the Winter. All of that work feeding, watching, and counting was for naught. I was at a beekeeping conference last year when one of the other researchers offered that it is much easier to be a bee researcher than a beekeeper. When our bees die it's data. When a beekeeper's bees die its his livelihood. But any beekeeper knows that feeling of approaching a dead hive. You feel it deeply. As you open the lid and peer down into darkness you think, what could I have done differently? The smell of decaying bodies and the weight of a hive box still filled with Winter stores serve only to fuel the feeling that you've let your girls down. And though my monetary investment may be different from a beekeeper's, my emotional investment is strong.

Primary Investigators tend to see data in dead bees. I see that too. But beyond that I see an area of agricultural research that is sad and tough. I feel very close to the beekeepers with whom I share stories and clasp calloused hands. We are all part of this sense of loss tinged with feelings of failure. When I started this job two years ago I was awestruck by the exciting research surrounding my field. Now I am fueled by an impatient determination.

There are many handprints on the Stationary Apiary CAP. I am proud to be a "worker bee" sorting through the chaos to find answers. And though bureaucracy, miscommunication, and vague protocols frequently frustrate me, I am bolstered by the importance of our goals.

I had the pleasure of meeting many of the principal investigators, technicians, and graduate students working on this CAP at the American Beekeeping Federation national meeting in Orlando, Florida this past January. I felt relief spreading through my veins toward my extremities and back toward my heart during our closed-door session on Wednesday. These researchers are brilliant and invested. I felt the old whispers of my awestruck self as they spoke about our project and its future. We are all in good hands.

Here is my Stationary Apiary CAP update. We in the beekeeping community, whether researchers or apiculturalists, have a long road ahead of us. Many of you have been traveling this road for some time. Take comfort in this. Every single member of the Stationary Apiary CAP team from the very top with Keith Delaplane and the other Primary Investigators to the very bottom with Jeremy, myself, and our motley crew are working together to find answers. Our progress will be slower than you or I might prefer, but we will never stop moving forward.

My laboratory will never function as well as a honey bee colony and I don't expect anyone to sacrifice themselves for the wellbeing of the project. But as worker bees we are loyal. We have your back, and we are not flying away from a fight. BC

Kerry Lynott is a Research Technologist in the Department of Entomology at Penn State University.

The Isotope Waggle Dance

How The Honey Bee Communicates With The Chemist

Lesley Chesson
Brett Tipple

It's getting easier to find out if it's really local

Is that jar of honey pure or has it been diluted with the addition of cane sugar or corn syrup? Many beekeepers are familiar with carbon isotope ratio analysis of honey, which can detect the adulteration of honey by the addition of cheaper sugars. Testing honey for adulteration using stable isotope analysis is inexpensive, the interpretation of test results is straightforward, and analysis time is short.

Yet honey producers, packers, sellers, and consumers often want to know where a honey is produced, in addition to knowing its purity. What to do? Here, we present a primer on a chemical analysis – hydrogen and oxygen stable isotope ratio analysis – that can provide region-of-origin information on a variety of organic materials, including honey and other honey bee products. U.S. beekeepers are fighting an ever increasing flood of illegally imported honey; hydrogen and oxygen isotope ratio analysis may be just the tool beekeepers need for determining the true origin of "funny" honey.

What is an isotope? Isotopes are forms of an element that have different numbers of neutrons within the nucleus. Unlike radioactive isotopes, stable isotopes do not decay. The stable isotopes of most elements exist in both common and more rare forms. For example, the element hydrogen (H) has two stable isotopes: ^{2}H and ^{1}H. The element oxygen (O) has two major stable isotopes: ^{18}O and ^{16}O. The slight mass difference between isotopes causes the isotope with additional neutrons ("heavier" isotope) to behave differently than the isotope with fewer neutrons ("lighter" isotope) during natural biological, meteorological, and geological processes.

Hydrogen and oxygen isotope ratios in biological materials record geographic information. The H and O atoms within plants and animals (including humans) originate for the most part from water (H_2O). That water came from rainfall containing a mixture of H and O stable isotopes. In the United States and Canada, the majority of rain-producing weather systems develop in either the Gulf of Mexico or the Pacific Ocean and move inland. Due to the slight mass difference, water molecules containing heavier isotopes tend to condense and precipitate faster than water containing lighter isotopes during these rainfall events. The result is a predictable continental distribution of water isotope ratios as shown in the map. In general, there are more heavy hydrogen and oxygen isotopes near coasts and fewer heavy isotopes inland.

Animals and plants incorporate hydrogen and oxygen isotopes directly into their bodies from local water sources. In other words, "you are what you drink." Thus, the hydrogen and oxygen stable isotope ratio analysis of a collected material – for example, honey or honeycomb – reflects geographic isotope differences and is useful in determining a material's region-of-origin.

Hydrogen and oxygen stable isotope ratio analysis has many applications in animal migration, ecology, food origins, and even forensics. In fact, this technique has been showcased in episodes of the television series Law & Order, NCIS, and CSI. While our laboratories may not be as shiny and clean as those seen on TV, the use of stable isotope analysis in crime dramas has a real scientific foundation. (No, we do not have blue lights on our cars and holographic computer monitors at our desks.) Here we present the use of hydrogen and oxygen isotope

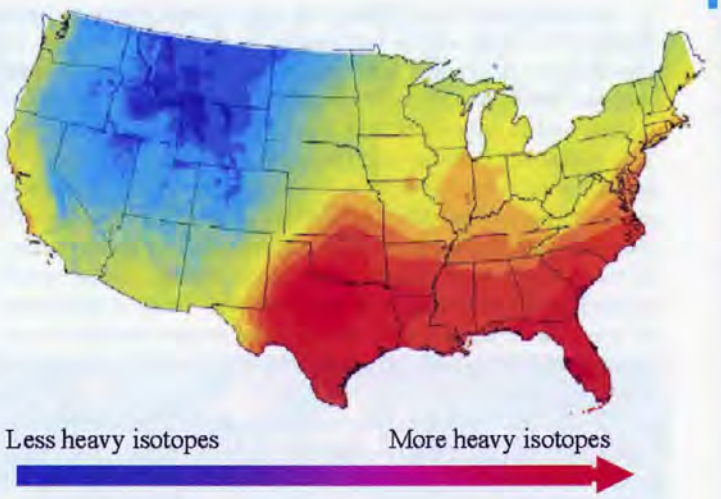
analysis in three case study examples that trace the geographic origin of a homicide victim, a seized bag of illegal drugs, and a gallon of milk in your refrigerator.

The case of Saltair Sally. In October 2000, the partially decomposed remains of a young woman were recovered from a shallow grave near an old concert venue (Saltair) on the shores of the Great Salt Lake in Utah. All that remained were hair, a few bones and teeth, and some distinctive personal effects. Local law enforcement agencies attempted to establish the identity of the woman through the local media, but no useful responses were elicited. Eventually, "Saltair Sally" became a cold case. In 2007, the State Medical Examiner released some of Saltair Sally's strikingly long hair to us for hydrogen and oxygen isotope ratio analysis.

The stable hydrogen and oxygen isotope ratios of Saltair Sally's hair revealed that she spent the two years prior to her death traveling within the Intermountain West, relocating every four to six months during that period.[1] While the results of the hydrogen and oxygen isotope ratio analysis could not provide investigators with zip code-specific location information, the analysis of Saltair Sally's hair allowed law enforcement agents to exclude 90% of the U.S. as a possible origin for the deceased.[2] As of today, this cold case sadly remains unsolved, but investigators are actively pursuing the case and are focusing on the areas predicted by the isotope observations.

Drug trafficking and stable isotope analysis. Mexico is the largest exporter of marijuana in the world[3] and it is therefore not surprising shipments of the drug are often seized at the U.S. border. However, some of the marijuana available within the United States is grown domestically and moved across state, rather than country, borders.[4] If law enforcement agents want to stem the flow of marijuana into and throughout the U.S., they need independent information on where marijuana shipments originated.

As part of the Marijuana Signature Project within the Office of National Drug Control Policy (ONDCP), we analyzed samples of marijuana seized in different regions of the U.S. The measured hydrogen and oxygen isotope ratios of the seized samples were then used to develop models to predict where a marijuana sample of unknown origin had been grown. These models are now available to law enforcement agencies to help the authorities determine from where the marijuana seized in their state or region is coming – local, regional, transcontinental, or foreign.[5]



Tracing the origin of your food. There is a growing trend among American consumers to buy locally produced foods and goods, a cause championed by the novelist Barbara Kingsolver in her latest work.[6] Despite good intentions, it is often difficult for a consumer to know that if the "local" food purchased was actually grown locally. Fraud in the food industry is becoming more commonplace, making the consumer's task to buy local more and more difficult as producers deliberately mislabel foods.[7]

As with the cold case and the marijuana case study, the isotopes in your food record information about its region-of-origin. For example, consider the milk in your cereal bowl. Dairy cows record the hydrogen and oxygen stable isotope ratios of their drinking water in the milk they produce.[8] Therefore, the stable isotope ratios of milk produced by cows at a local dairy should resemble the stable isotope ratios of the tap water available to consumers in the surrounding regions. Vice versa, the hydrogen and oxygen stable isotope ratios of milk of unknown origin can be used to predict the drinking water isotopes – and thus geographic source location – of milk of unknown origin. The same isotope approach can be used to investigate the regions-of-origins of other foods and beverages, including bottled waters,[9] soft drinks, beer,[10] and wine.[11]

Conclusions. The naturally occurring geographical variations in the stable isotopes of hydrogen and oxygen in water across the United States provide us with a map – a map that can be used to trace the origins of food, the movements of people, and to help authorities learn the origin of illegal drugs. This leads back to honey and the question: From where did that jar of honey come? Preliminary research we have conducted on bee products provided by readers of *Bee Culture* suggests that the stable isotopes of water are recorded by plant nectar. In turn, honey bees record plant nectar stable isotope ratios in the honey and honeycomb they produce. Thus, it may soon be possible to analyze the hydrogen and oxygen stable isotope ratios of bee products and determine where indeed that jar of honey originated.

While the use of carbon isotope ratio analysis to detect sugar addition to honey is well established in the beekeeping community, we believe that hydrogen and oxygen stable isotope analysis to trace the origin of honey may one day be just as commonplace. The American beekeeper today is facing a host of challenges including the growing incidence of transshipped honey imported into the U.S. To protect the domestic honey market from illegal overseas shipments of honey and to provide buyers with confidence in honey's source, hydrogen and oxygen stable isotope ratio analysis could be the newest tool in the beekeeper's arsenal. BC

For more information on stable isotope ratio analysis of honey or to receive copies of the references cited here, please contact us: IsoForeniscs Inc., 423 Wakara Way, Suite 205, Salt Lake City, UT 84102, 801-755-7990

References

[1]J.R. Ehleringer, A.H. Thompson, D. Podlesak, G.J. Bowen, L.A. Chesson, T.E. Cerling, T. Park, P. Dostie, H. Schwarcz, in *Isoscapes: Understanding movement, pattern, and process on Earth through isotope mapping* (Eds.: J.B. West, G.J. Bowen, T.E. Dawson, K.P. Tu), Springer, 2010.

[2]P. Owens-Liston; *Real life CSI is hair, Time* 2008, March 7, **www.time.com/time/health/article/0,8599,1720520,00.html**

[3]J. Beaubien; *Cash from marijuana fuels Mexico's drug war,* NPR 2010, May 19, **www.npr.org/templates/story/story.php?storyId=126978142**

[4]H. Rosner; *Telltale isotopes in marijuana are nature's tracking devices,* The New York Times 2007, August 21, **www.nytimes.com/2007/08/21/science/21mari.html**

[5]J.M. Hurley, J.B. West, J.R. Ehleringer; *Stable isotope models to predict geographic origin and cultivation conditions of marijuana,* Science and Justice 2010, *50,* 86-93.

[6]B. Kingsolver, S.L. Hopp, C. Kingsolver; *Animal, vegetable, miracle: a year of food life, Animal, vegetable, miracle: a year of food life,* HaperCollins, 2007.

[7]L. Layton; FDA pressured to combat rising "food fraud", *The Washington Post* 2010, March 30, **www.washingtonpost.com/wp-dyn/content/article/2010/03/29/AR2010032903824.html**

[8]L.A. Chesson, L.O. Valenzuela, S.P. O'Grady, T.E. Cerling, J.R. Ehleringer; *Hydrogen and oxygen stable isotope ratios of milk in the USA,* Journal of Agricultural and Food Chemistry 2010, DOI: 10.1021/jf904151c.

[9]G.J. Bowen, D.A. Winter, H.J. Spero, R.A. Zierenberg, M.D. Reeder, T.E. Cerling, J.R. Ehleringer; *Stable hydrogen and oxygen isotope ratios of bottled waters of the world,* Rapid Communications in Mass Spectrometry 2005, 19, 3442-3450.

[10]L.A. Chesson, L.O. Valenzuela, S.P. O'Grady, T.E. Cerling, J.R. *Ehleringer; Links between purchase location and the stable isotope ratios of bottled water, soda, and beer in the USA,* Journal of Agricultural and Food Chemistry 2010, DOI:10.1021/jf1003539

[11]J.B. West, J.R. Ehleringer, T.E. *Cerling; Geography and vintage predicted by a novel GIS model of wine* $\delta^{18}O$, *Journal of Agricultural and Food Chemistry* 2007, *55,* 7075-7083.

QUEEN INTRODUCTION

A Review Of The Different Life Stages Beekeepers Routinely Use

Larry Connor

Queens may be introduced in a variety of her life stages, from eggs and larvae on a frame of worker brood as part a queenless and broodless mass of bees, to a fully mated, fully functional laying queen transferred from another colony. Here is a review of the different life stages beekeepers routinely use, and a few they rarely use, but may be wise to consider:

1. Addition of brood – Many beekeepers move brood and bees to set up a new hive, allowing the bees to generate their own queen cells using the emergency instinct. This allows the bees to select the larvae they want and produce their queen. If the frames selected have a limited number of the optimum aged larvae for cell production the bees may be forced to develop queens from older worker larvae, and that is not always a good thing. The quality of the royal jelly feeding of the queen will depend upon the strength of the group of bees provided with the brood, and the age distribution of those bees. Optimal royal jelly feeding and queen cell provisioning requires a healthy component of nurse bees. Finally the development time from set up to egg laying by the queen, and the first emergence of worker bees is the longest of these options. Some beekeepers have a long tradition of setting out boxes of bees and brood and letting them grow, mate and foster their own queens, but it may be the least efficient method of meeting this goal. There are better methods available for queen starting than this.

2. Use of open queen cells – During swarming and supercedure beekeepers will find started queen cells on frames, cells the bees have not yet finished building, and move them into otherwise queenless colonies. These are often increase colonies, and come from larger hives divided into smaller nucleus colonies. This offers the beekeeper some level of selection of the started cells, and selection of the genetic stock of the queen. I have used this when a valuable or favorite queen has gone missing, and only her daughter cells remain. It is a way to perpetuate a particular queen, hopefully in a daughter with some of Mom's redeeming characteristics!

Queen cell on the side of a brood comb may be used to establish a new colony.

3. 48-hr queen cells – A small but growing number of beekeepers are moving grafted queen cells two days after grafting. The reasons for use of these cells are these: a) The queens are from a particular stock, and this offers a low-cost option for introducing a particular stock into an apiary; b) At the 48-hr stage the larvae is still quite small, and still unable to move from the mass of royal jelly in the started cell; c) If produced in a quality queen rearing operation, the cells will be well filled with royal jelly, with often 80 to 90% of all the jelly the larva will receive from the nurse bees before sealing; and d) Last and perhaps most important, these cells may be transported a number of hours outside the hive with no apparent harm to the developing larva. This allows for beekeepers to travel a distance from the source, or to ship the cells by overnight delivery. A cell may be carefully placed into a brood frame so the tip of the cell hangs downward and the bees are able to complete the cell building process. My favorite aspect of this system is the rapid feedback I get from looking at the cell two or three days after introducing the cells into a new group of bees – if the queen cell has been accepted it will be sealed and well cared for by the bees. But if they decided that the larva was not perfect, if the larva was overheated during transport, or for any other reason defective, you know it right away. No need to wait another week or two to take action, such as add another cell, search for the overlooked and very stealthy queen in the box, combine the brood with a hive that has got it right and has a fully sealed queen cell. The system still requires most of the queen development time (about nine to 10 more days before the queen emerges), and the time for mating and egg laying to start.

When you are a little late getting to the queen cells, one of the queens will emerge and destroy her sisters in their cells. The damage is from the side, not the tip of the cell.

4. Ripe queen cells – About a day before a queen is ready to emerge from a cell, we call the cell 'ripe.' These are often characterized by having the tip of the cell removed to expose the brown silk of the cocoon under the wax layer the workers build around the larva. The workers do this to detect the queen pheromone being produced by the developing virgin inside. Ripe cells are the stock and trade of commercial beekeepers, and a few cell producers like David Miksa and family in Groveland Florida have made it their business to produce high quality queen cells from a number of different queen stocks. As I have traveled in the United States and Canada I have learned that there are many local sources for ripe queen cells, but rarely is this fact advertised. This is often due to the huge demand for queen cells from the late Winter through early Summer, depending on where the operation is located. So check around if you want a dozen or so queen cells – it is not worth the bother to sell ones and twos because of the low cost of the cells themselves. The cost will vary from source to source, and at different times of the season.

A number of producers sell small lots of locally adapted queen cells from $7 to $10, much higher than the prices charged by commercial operations in Sunbelt states.

Queen cells are used in increase colonies, often called splits or divides. They are positioned against the brood frame so the sides and tip of the queen cell are hanging down in the frame as they would in nature. It may be necessary to find an indented area of brood comb or actually cut away the comb. Other beekeepers use the plastic arms of the cells to place them carefully on the top bars of frames. As long as no cold weather is expected, it works fine. Some beekeepers use a different color plastic cell base and will leave the cell in the colony as their record of which grafting stock the queen represents.

Some beekeepers introduce queen cells into the honey supers during the nectar flow as a means of replacing any queens that are 'on the edge' of replacement. Since colonies often use the nectar flow as a time to supersede queens, this timing is right. The ripe cells are placed in the nectar-filled supers, allowed to emerge and mate. Since she is a young queen and the other queen is old, fighting is less likely and usually youth replaces age as a dimension of the supersedure queen replacement mechanism. If your old queen was marked, the appearance of a vigorous unmarked queen will document queen replacement when you do you post nectar flow hive inspection.

5. Virgin queens – I have long been instructed that virgin queens cannot be used for introduction, but my personal experience is that you are able to use them the same you would a mated queen. Unmated queens do not produce as much pheromone as a mated queen, but they are queens and do generate a chemical signature the bees recognize and monitor. When queen cells approach emergence, place them in cages so the queen will be confined (and kept from performing harm on her sisters). She should have room to move, and emergence in the JZsBZs plastic queen protectors resulted in 50 percent mortality as the queens could not fully move about in the cage. But this is not the intended us of this cage! A larger plastic cage or wood cage/container allows for movement and the queen may enter her old cell to feed on the remaining royal jelly found there. I like to add a small ball of queen candy to the bottom of each cage and the queen will feed herself. This is very important to keeping a large number of caged queens alive in a queen bank or cell finisher (they are basically the same colony).

Keep virgin queens in a queen bank for 10 days. After that I expect there is increasing difficulty getting the queen to mate and lay normally. However, I have had older virgins weeks past emerge mate and return to the hive and head excellent hives, indicating this area of bee biology needs a bit more research.

The key to using virgin queens is to treat them just like mated queens during introduction. Do not direct release virgins, even though many beekeepers will tell you to do just that. I leave the virgin queen in a

Some of the cells we were able to produce in April in Galesburg, Michigan. In this area, the drone population will be mature at the time these queens are ready to mate. (The farm has produced Christmas trees since 1959 but the bees are the growing part nowadays.)

wood cage with tape or a staple over the cork, and a plastic queen cage with the cap over the candy end. Leave the queen between frames of brood for three to five days, and then remove the staple, tape or cap. Then return the queen to the frame so the bees will chew out the queen candy. Do not direct release virgin queens, as they are able to fly – and will! Just recently I had a virgin fly away from the hive, but since she was marked I knew it was she when I returned to the hive to check the queen cell that I put between to frames of brood as an insurance policy. The queen cell was torn down, but my marked queen was laying eggs on the brood frame. Obviously she had oriented to the site when she flew away and was able to return. Just how long does it take for a queen to learn her hive's coordinates?

Virgins offer a lower cost alternative to get a certain genetic stock. If you have a pool of desirable drones in your hives, this offers a means of bringing in new stock to test against that drone supply. Virgins are lower priced than mated queens, and their use is vastly underutilized by the beekeeping industry.

6. Mated and laying queens – Most beekeepers start with mated and laying queens when they start beekeeping. These are queens that have completed the development cycle, emerged as virgins, been placed into a mating colony, mated, and then harvested for sale. Commercial queens are often very young, having laid eggs for a few days at best. Others may be found that have been kept in larger mating nucs for several weeks to several months and have developed fully. Queens in packaged bees are not the bee's mother, in fact, they may not even be genetically related. Queens in nuclei are almost always the queen that produced the brood that is in the hive, but maybe not the bee's mother, since they are from the colony that was divided to generate the nucleus.

The ideal queen introduction uses a queen that is removed from one colony in an apiary, such as a holding nucleus, and placed into a push-in introduction cage and allowed to start laying in that colony without a serious decline in her function as a queen. When queens are ordered from some distance, the queen is removed from either a mating nucleus or a queen bank, caged, shipped and delivered to you for introduction. She will be shipped with workers in the cage with her or in a battery of queens with nurse bees around the cages to provide feed, heat control, and support.

48 hr queen cells produced in a queen rearing class in Langsburg in June. After the class several of us took these home and installed them in increase colonies. Some had the cells drawn out by the nucleus bees, and I had one mate and is laying nicely. It did not save much time in the development of the queen, but it made it possible to 'sample' genetics from another Michigan beekeeper. The cell bar is a new prototype we have looked at this year, provided by Jim Payson of JZsBZs. The cups insert and twist to lock in. It speeds prep time before grafting!

The longer a queen has been outside a hive, the larger the hive you are introducing a queen into, and the more genetically UN-related the queen is from the worker bees, the more important it is to delay the release of a queen into a group of bees. When smart beekeepers purchase an expensive queen for breeding they often used a delayed release system in a small nucleus of bees. They keep the queen confined in an escape-proof cage for five to seven days, return to the hive and remove the staple, tape or cap. I like to walk the queen out at this time, releasing her so I can observe the behavior of the queen, and more importantly the workers, on the comb. The queen should be quiet on the comb (not taking to the air like a virgin), and some bees may offer her food. The newly released queen will often go to a cell of honey and take a long, deep drink. If there is any evidence of aggressive behavior toward the queen, as shown by bees crawling on her body and curving their abdomen as if to sting, gently remove the queen and place her back into the cage for release later. If you have not been feeding the colony, feed with a thin syrup to encourage food exchange from bee to bee.

Next month we will continue with issues of finding the queen, replacing and introducing queens (especially in the Summer months), and a discussion of managing queens in packages, nuclei hives and a wide range of queen problems. BC

August will find Dr. Connor on the West Coast for the Western Apicultural Society meeting in Salem, OR. Hope to see you there! Later this Fall there is a possible drive out West to the Denver area, so check in with Dr. C. to see if he could schedule a meeting in your area to or from the area! And always get updates at ***www.wicwas.com****.*

LANGSTROTH AND THE ITALIAN BEES

Roger Hoopingarner

Langstroth's research found a bee that was productive, wintered well . . . and gentle. No wonder it dominated beekeeping.

The first known shipment of honey bees to America was soon after the early settlers found that there were no honey bees for a supply of honey or for beeswax. I suspect that it was the beeswax that was missed the most even though the lack of a sugar was quite important. Beeswax was used for many things including the all important candle. There is even speculation that the Vikings may have even brought bees to America, also for the same reason of the need for candles. Specifically, for the candles on the Christian altar. In any event, the first bees brought over were from northern Europe and were most assuredly *Apis mellifera mellifera*. This subspecies of the honey bee, the type species in Linneaus' animal classification, is dark brown to black in color and quite defensive of their hive. I ran into a few of these colonies when I first started beekeeping 60 plus years ago, and these encounters were memorable. Thus, for more than 200 years the only subspecies of honey bee was the European (or German) brown bee.

The Northern European bee thus spread throughout Eastern North America not only by swarming but also through transport by the settlers as they moved west. These same bees (Northern European) were also transported to California via a trip around the tip of South America after gold was discovered there in 1848. These long ocean trips say something about the resilience of the honey bee as well as the resolve of the people transporting them such long distances. Today we think nothing of sending queens via the mail all over the world as it only takes a day or two to anywhere. However, in the 1850s a trip from Europe was weeks to months for a crossing and likewise for a trip around South America to California.

Thus, the honey bee that Lorenzo Langstroth began his beekeeping with in 1838 was *A. mellifera mellifera*. The thought, to me, of cutting a comb from a box hive, or skep, to transfer it to another hive with these bees is almost unthinkable. Maybe they had selected a more gentle strain than I found more than a hundred years later, but I doubt it.

During the years following his starting with bees Langstroth did a lot of reading and writing to other beekeepers. His reading included some of the ancient Greek and Roman (Latin) writing on bees. It was in these writings that he first found mention of the Italian bee. He obviously liked what he read in the descriptions of this honey bee. From Virgil," ...as spotted or variegated, and of a beautiful golden color." Then later Spinola describes the bee in greater detail, and it would appear that this Italian bee had not changed in 2000 years. In the early 19th century Europeans called it the Ligurian bee. (The Italian bee has since been given the scientific subspecies name of *Apis mellifera ligustica*.)

Langstroth had a good friend and correspondent, Samuel Wagner, who was fluent in German and often translated articles or letters and sent them to Langstroth. In the third edition of "*The Hive and the Honey Bee*," there is published a letter by Mr. Wagner concerning the Italian Bee quoting writing of Dzierzon and Von Berlepsch among several others. Most of the observations of these outstanding beekeepers and scientists all cited their color, gentleness, industriousness, early swarming, (remember swarming was important to the beekeeping practices of the time) and ability to Winter well. Samuel Wagner was so impressed that he had tried to bring a colony of Italian bees to the U.S. in 1853 but the colony died in transit. In the Spring of 1859 Langstroth, Wagner and a Richard Colvin, of Baltimore, brought over Italian bees. I am not sure if this is the first such importation or not, but certainly one of the first.

Some years later Frank Benton, of the U.S. Department of Agriculture was sent to Europe and Italy to send back more queens. Benton, using a modification of a previously described queen cage by Langstroth, began the importation of Italian queens. As a side note, Benton became much more enthralled with the Carniolan strain of bee (*Apis mellifera carnica*) found in the Alpine region of Europe. And these bees were also imported into the United States.

Thus, the monopoly that the Northern European bee had in America was broken. The Italian bee became more and more favored by beekeepers and thus were passed from beekeeper to beekeeper via queens and swarms.

In the writing of Dzierzon and Von Berlepsch (or Langstroth) it is clear that they did not suspect that a virgin queen mated more than once. There is the statement that of out of 189 queens mated half remained

pure Italian and the others were of a bastard type, meaning that they had mated with the common bee and thus were not pure Italian. How then did they maintain the Italian strain in an area of mostly other bees? There are several possible answers. First, they didn't, but thought they did. Why is that?

We need to go into the genetics of color in honey bees. Many years ago, W.C. Roberts wrote his Ph.D. thesis on the genetics of color in bees. What he did was take a banded Italian stock, and by using instrumental insemination, mated queens with single drone inseminations. Some queens were mated to light drones and some to dark or black drones. Using various backcrosses he determined that there were eight major genes responsible for color in bees. If the bee had all "light" genes you ended up with a golden Italian, and all dark genes and the bees were black. What may have happened in those matings in Germany by Von Berlepsch and Dzierzon was that the Italian queen mated with enough lighter drones that the offspring were banded and looked like Italian, and some of the drones mating with these virgins may have been Italian drones. When the preponderance of drones were dark then the colony was discarded as being "bastard."

There are other possible reasons. It is known that the drones of many of the honey bee subspecies fly at slightly different times on the warm, sunny afternoons. If the virgin queens chose to fly at the peak of their subspecies drone flight it is possible that all of the drones mating with the virgin would be Italian. It is also possible that there is more assortative mating going on than is recognized. That is, that virgins tend to mate with drones of their own kind. It is possible that all of these mechanisms were operating such that at least a large portion of the queens that they mated retained "Italian" characteristics.

There is another powerful mechanism that operates to keep characteristics somewhat constant in a subspecies. This mechanism is chromosome linkage. When two different sub species mate the subsequent female bees (diploid workers and queens) have a set of chromosomes from the mother queen and a set from the drone father. There is a certain amount of crossover between the paired chromosomes when they come together at meiosis for gamete production of eggs or sperm, but mostly the chromosomes retain their original lineage. It is this chromosome linkage, or integrity, that allows the Italian bee to retain most of its characteristics in the United States today in spite of the large amount of different subspecies that have been introduced and have been maintained. Thus, with an eye to observe the characters that distinguish the Italian bee, you can retain, or recover, the original bee, at least to a major extent.

Certainly, after its introduction into the United States, and probably due to subsequent importations of the Italian bee, it became the dominant sub species for many years. In the 1920s and 1930s the Province of Ontario had a big campaign to have beekeepers switch to Italian bees to help eliminate European Foulbrood (EFB) that was a major problem at the time. It is interesting that the Italian bee at that time was at least somewhat resistant to EFB. Yet, 30 or 40 years later the Italian bee had lost all its resistance to EFB, at least in Michigan.

The German brown bee has essentially been replaced, which is probably a good thing.

How did that happen so fast? It is hard to say exactly, but it is possible that the Italian bee had crossed with enough common stock that it lost its resistance. Or possibly the micro organism mutated and became more virulent.

The Italian bee became the dominant sub species in Europe for many years. However, in recent years the Carniolan race has become dominant there. The Carniolan bee has also seen a significant increase in the U.S., especially since the tracheal mites and *Varroa* mites have been introduced from Europe. The Carniolan bee was more resistant to the tracheal mite, though not so for *Varroa*.

There were other introductions of other sub species. For example, the Caucasian bee from the Caucus mountains and the Republic of Georgia. This sub species had a significant rise in the 1950s and 1960's when Dadant released the Mid-nite hybrid strain. This strain, and all of the Caucasian bees that I am familiar with, are black with gray hairs, or setae. When I visited the Republic of Georgia in 2008 I visited several apiaries. In one queen rearing and royal jelly production operation, east of Tbilisi, they showed me what they proudly called the Caucasian bee (See Figure). As you can see these bees are not dark or black. When I questioned the beekeeper on this point, indicating to him that what we called Caucasian were black, he told me that the black

Caucasian bee comes from Western Georgia and the light or banded ones come from Eastern Georgia. Thus, it would indicate to me that our importation of the Caucasian bee came from Western Georgia.

The Italian bee is still the dominant sub species in the United States, though the Carniolan bee is making big inroads to that dominance. The original bee, *A. mellifera mellifera*, has been essentially replaced by the subsequent importations starting in the 1850s with the importation of the Italian bee. (There are still a few of these mellifera genes circulating within our population of bees.)

These legal importations continued until 1922 when the United States and Canada established a ban on all importations because of fear of importing the Isle of Wight disease that was devastating England (subsequently determined to be the tracheal mite). This ban was effective for a little more than 60 years when tracheal mites and varroa mites obviously were brought into the country via illegal importations of bees from Europe.

Beekeepers today can be thankful that Langstroth, and others, were able to read and understand ancient and European languages so that they could learn about many of these sub species of honey bees. It was through their diligence and willingness to make these difficult importations of Italian, Carniolan and Caucasian bees. It was these importations that have given us the honey bee stocks that we have today. We owe these beekeeping pioneers a real debt of gratitude. BC

Roger Hoopingarner is the Michigan State University Extension Specialist in Apiculture, retired, and the author of The Hive & The Honey Bee, Revisited – *An Annotated edition of LL's 3rd edition.*

All The Buzzzz in...

Hello Friends,

This month it's all about me! I hope you are having a fun summer with family and friends.

Bee B. Queen

Bee B. Queen Challenge

Send me a poem or song about the queen bee. Take a tune you already know and change the words. Here are some tunes you may know:
"Hickory Dickory Dock"
"Mary Had a Little Lamb"
"Row, Row, Row Your Boat"
"Twinkle, Twinkle Little Star".

Olive Bee Sayre, 8 NJ

It's a wonder how bees work together just like we should.
Elmer Stoltzfus, 10, PA

Nicholas Walrod, 5, MS

Lucas Sergent, 5, WV

A Song Fit For a Queen

Sing to the tune of "The Bear Went Over the Mountain"

The queen bee lays the eggs.
The queen bee lays the eggs.
The queen bee lays the eggs.
That's all she does all day.

She doesn't even play.
No soccer or ballet,
The queen bee lays the eggs,
Yeehaw, hip, hip, hooray!

Long Live the Queen

The most common questions people ask beekeepers are about the queen bee. Let's learn more about the queen.

The queen bee is an important part of the hive. She lays all the eggs and produces a scent that keeps worker bees from laying eggs and keeps the hive happy.

Find the queens

Circle the queen bee in each photo.

If the queen bee dies or if the hive is too crowded, the workers make a new queen. They choose an egg that has been laid and feed it royal jelly. Every bee is fed about 3 days of royal jelly but when the bees are making a new queen, they feed her much more of the nutritious royal jelly. By doing this, the queen will develop to be able to lay fertilized eggs. The bees make the cell much larger to accommodate the queen. We call these cells queen cells.

Queens lay an average of about 1000 – 1200 eggs a day. In the summer she can sometimes lay up to 2,000 a day. A queen can lay about 175,000-200,000 eggs a year.

A queen bee lives about 2-5 years. Figure out about how many eggs the queen could lay in her lifetime. (Hint: If she lives to be 4 years old multiply 4 times 200,000.)

1. pheromone, 2. abdomen, 3. drone brood, 4. brood, 5. royal jelly, 6. queen cell, 7. queenbee, 8. mating flight

... Bee kid's corner

Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
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queeny crossword

Across

3. Baby bees that are male. (two words)
4. Baby bees
6. A cell where the queen develops. (two words)
7. The only bee in the hive that lays fertile eggs. (two words)
8. The flight taken by a virgin queen to mate with several drones. (two words)

Down

1. A chemical produced by the bees that uses scent as a form of communication.
2. The queen bee has a larger _____ than the worker bees.
5. Food produced by a gland in the worker bee that helps to develop a larvae into a queen bee. (two words)

Six year old R. J. Suggs and his mom are new beekeepers in Cheraw, SC.

Photos - Kim Flottum

Beecome a Bee Buddy

Send two self addressed stamped envelopes and the following information to: Bee Buddies, PO Box 2743, Austin, TX 78768. We will send you a membership card, a prize and a birthday surprise!

Name: _____

Address: _____

City, State, Zip Code _____

Age: _____ Birthday: _____

E-mail (optional) _____

Send all questions, photos and artwork to: beebuddies@hotmail.com or mail to the above address.

READING FRAMES & COLONIES

At Best An Uncertain Skill

James E. Tew

Frame reading

At several recent bee meetings I have attended, *"Frame Reading"* has been a popular lecture topic. At first flush, I like the concept. It is helpful to tell novice beekeepers what to watch for and what various biological activities may portend for the colony. However, at second flush, while I still like the concept, I begin to feel that only reading frames may be too narrow. Maybe the concept should be, "Reading Bees," but then maybe that's just a bit too broad. Where's the high ground?

Colony reading

Reading frames is just part of the hive inspection procedure – albeit an important one. But as one is "reading frames," they are also reading the colony. Does this one frame represent the colony or is this frame unique in the colony? The beekeeper is also reading the season of the year. Is it early Spring or late Fall? Big difference. Then, there are the more subtle differences. Is the beekeeper new at honey bee culturing or does the beekeeper have a good idea what he/she is doing? Knowing the recent history of the colony is important in reading the frame. For instance, was this colony used in producing queens last month? Was this colony split a month ago? You can't know too much about the colony being evaluated. The frame you are reading represents a summary of the recent events in the colony.

The frame before you represents both the past and the future of the colony. But even more, being able to select the appropriate frame to read is important. There are commonly 20 deep frames in the typical beehive. If the frame was made up totally of worker-sized cells, it would have about 6800[1] cells on the two sides of the frame. So if you are inspecting a colony housed in 20 frames in two deep brood bodies, the unit would (hypothetically) have 136,000 cells. Different cells on different frames are used for different things.

So, if you are monitoring wax comb construction, you would read different frames than if you were monitoring for the presence of a queen. Most of the time, brood frames are the frames of interest. Pollen, nectar, brood, queen presence, disease, and general health are all readable from the average brood frame.

#1 real-life Case Study of frame reading – package colonies

Last Spring, I purchased packages and installed them in the normal way. Of the 22 packages I installed, two had queen problems. One package had a dead queen in the queen cage while the other package had an open queen cage. The queen was gone from the cage. This case study is a description of the fate of the colony that had the open cage (apparently having a free-running queen).

Hoping that the queen had the good fortune to be accepted by the bees in all the confusion of the shaking process, I gently but firmly shook the bees from the package and closed them up. In previous articles, I have written about my procedure of supering with deeps in order to have honey stored in deep frames. I had plenty of honey to give this fledgling colony. If the queen was there, the colony should be in good shape.

When I released the queens in the other packages, I expectantly opened the mystery colony and "read several frames." I found no queen and no sign of eggs, but the bees were strangely calm and quiet on the reading frame.

On the read frame: No queen, no eggs, bees quiet and apparently normal.

Maybe she was there and I had just rushed her presenting herself. I reassembled everything and gave the colony another four days. When that time had passed, I had the third look on several frames and found nice brood "areas" surrounded by honey and fresh pollen but not a single egg. Was my vision failing? She should be here. Bees on the frame were quiet. Cell preparations were indicative of a queen being on the scene.

On the read frame: Normal looking preparations, but no queen and no eggs.

I took a frame having a small patch of new brood from a nearby colony and put it in the center of the mystery colony. I wanted to see if the bees would initiate queen cells on that frame. They did. There was no queen there.

[1]Worker cells may be smaller than the commonly accepted 5 worker cells per linear inch. Hypothetically, there could be even more 136,000 worker cells on the frame. But drones cells, queen cells, burr comb and transitional cells all take up space and are not considered in the estimation. It would be a very rare comb that is comprised of ***all*** worker cells.

On the read frame: Queen cups and queen cells present ergo no queen.

What now? I could order a replacement queen. I could combine them with one of the new queen-right colonies, or I could let them rear a queen and then subsidize them later with brood from my other colonies. The Spring season was still early. I had plenty of bees and brood. No harm done in letting them produce a natural queen. I went on with my life while the bees in that colony went on with theirs. I took walks back to the bees and "read" the entrance activity. Good traffic. Pollen collectors were fairly common. An appropriate number of dead bees were out front. Based on those observations, all appeared to be on schedule. Things felt right.

However, things did not go right. When I returned to the colony to have a look at a frame, it was all wrong. It was an easy "read." Laying workers. The empty queen cells were opened from the sides and multiple eggs were in individual cells. Through it all the bees were good collectors and were quiet on the comb. My bees and I had made bad decisions, but my part of the deal seemed worse. I should have checked more often or something.

On the read frame: Laying workers. Random drone cells. Complete absence of worker cells. Too many small, undersized drones. Aged workers with black thoraces and frayed wings. Even so, good nectar stores and defined brood area. Other than academic interest, this colony is doomed.

What to do? (For the second time). Easy call here. Combine them with a neighboring strong colony. I placed a layer of newspaper across the top of the stronger colony upon which I placed the laying worker colony. I made a few unnecessary slits in the paper but such slits are commonly recommended. I removed all presence of the weaker colony and caused general confusion to the bees in both colonies. A bit of smoke helped some, but not much. I left the scene. The next day, an "entrance read" showed nothing, but by Day #2, the evidence was easy at the entrance. Newspaper shreds were everywhere. All signs of confusion were gone (but there were about 200 dead workers in front that I could not explain.)

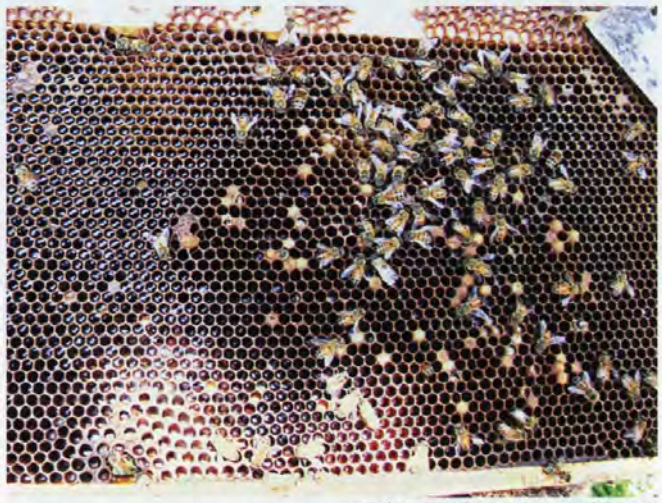
On the entrance read: Paper shreds out front, otherwise a calm colony during early Spring. Not a happy ending, but at least an ending.

Now there is no sign that the other colony ever existed in my yard. The combined colony is queen-right and all is quiet. The installation of this abortive queen situation went according to the book, but I certainly can't say it went well. Every step of the way, frames had to be read and entrance activity monitored.

Reading frames – more than just a visual endeavor

No doubt what you see is the most important aspect of frame reading, but what you smell and, to some extent, what you hear is also important. Fresh springtime nectar smells good. The secretion from the Nasanov gland smells like clean straw. For about 60 percent of us (I am guessing here.), the smell of American foulbrood is unmistakable – but not always. If the infection is recent, there will have not been enough accumulation of decaying larvae to be smelled. That comes later when there are open cells everywhere.

Queen cups produced overnight.



Laying workers. Beyond hope.

Tools used to break deep hive bodies apart.

Stylized photo showing a frame being driven from a deep hive body.

American foulbrood found on the "read" frame.

#2 real-life Case Study of frame reading – big, established colonies

Last Spring I got out in front of my schedule and successfully supered before the flow started. As usual, I supered with deeps – back-breakingly heavy when filled with honey and bees. The colonies I was working were big, populous, and heavy. I was giving them space in order for them to do more of everything. These are not hobby hives that get abundant loving attention. These are work hives that pollinate crops, produce the occasional honey crop and provide bees for research projects. They are soundly stuck together with propolis and comb. I work alone and I am now admitting that I am not young. Unless something demands it, I look at a single brood frame in these big colonies. I feel that they got big by themselves and until they are becoming smaller, I should leave them to their own devices. Out of 40 – 50 deep frames, how should I choose just one to read?

Frame selection procedure

To choose my frame, I remove the outer cover and lay the colony on its back. These colonies are so rarely worked that they seldom break apart (so far they have never broken apart). I use a short-handled hammer and a hive tool as a wedge to break the deeps apart.

From the bottom, I can tell which frames probably have brood. I roll that deep to one side. I lay the blade end portion of the hive tool flat on the bottom bar of the frame. Then I hammer on the end of the hive tool (and consequently the end of the bottom bar) to drive the frame out of the brood box. If I hit the bottom bar directly, it will break. A few licks on one end bar and then a few licks on the other end bar will drive the frame out evenly. A fired smoker to keep the bees calm is a necessity.

When I look at the "read" frame from one of these big colonies, I am really looking for American foulbrood (AFB) – and then anything else. Evidence of *Varroa* or maybe a failing queen, but really I am looking for AFB. I will also apprise the number of bees in the colony and take a quick look at the number of dead bees in front of the colony.

The colony in question was housed in five deeps. The top two deeps were staggered to help with ventilation. The colony had good weight and had a "good" number of bees guarding the upper entrance. Strange. I thought it would need another deep, but it still had upper space. Acceptable flight was occurring at the entrance with pollen collectors mixed in with the entrance confusion. Only a few dead bees were on the ground. Not a great colony, but not a bad colony.

On the entrance read: Good entrance activity. Pollen collectors present. Few dead bees. Not a lot of activity, but enough. Probably an "average" colony.

I chose my frame and drove it out from the bottom. Instantly, it was an easy read – American Foulbrood. The smell was there. The punctured, greasy cappings were there. It was an easy read.

On the read frame: Advanced American foulbrood. Decent bee population and sufficient honey stores present. Clearly a diseased colony, but not yet a failed colony. However, based on this one frame alone, this colony will not recover.

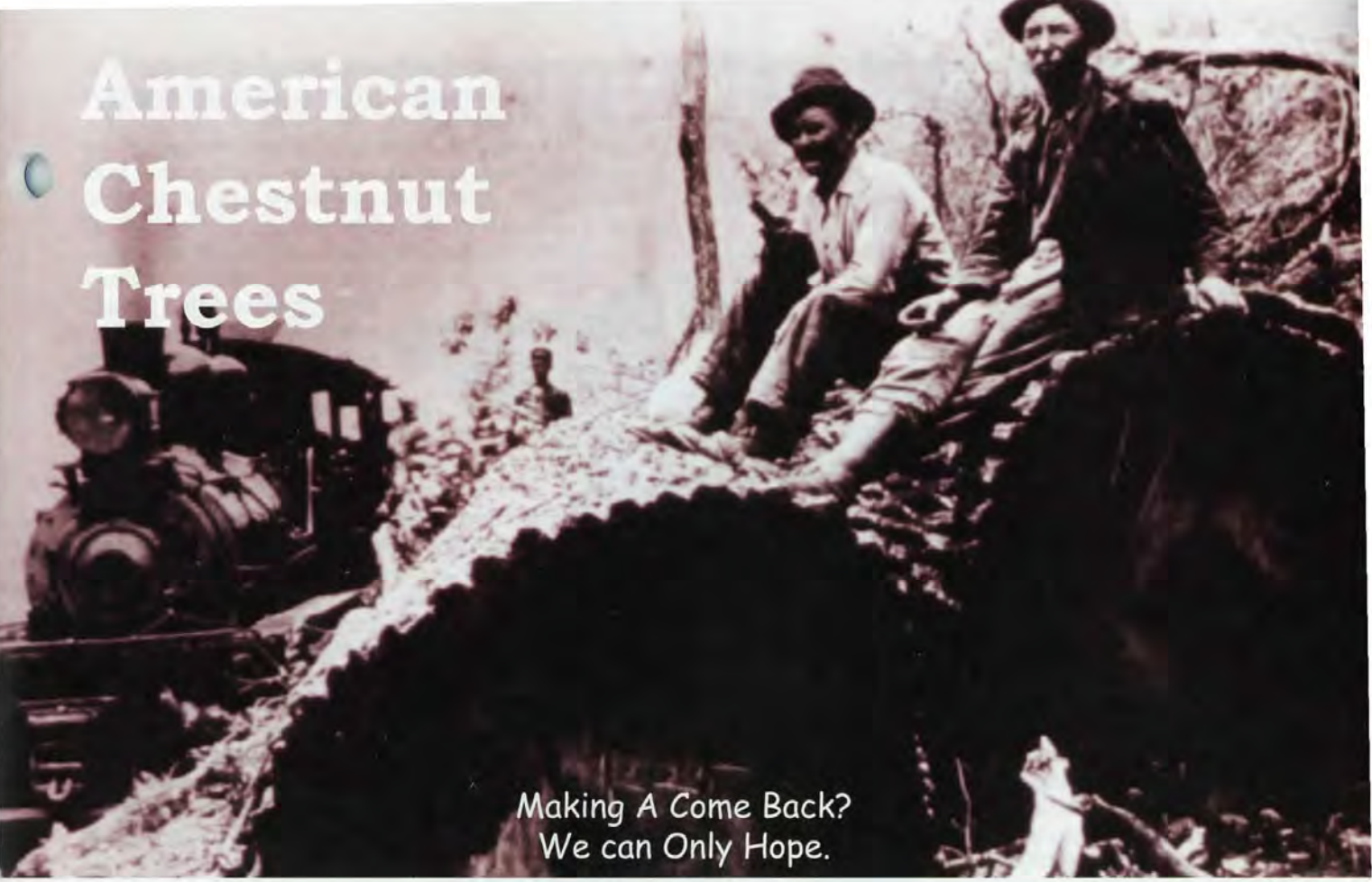
Of the 25 colonies I worked, only this one had a serious problem. What should I do with this colony? Have the other colonies been affected? These and many other good questions are beyond the scope of this article's topic. But the frame and colony read did catch a problem with this hive. That is how things are suppose to work.

Frame-reading...not foolproof

Reading frames is only part of a colony's inspection, but it is a very important part. Even so, looking at one or two frames is always an estimation of the colony's condition. But that's usually enough. And you should know, that in this article, I did not discuss the many colonies I inspected with good queens, good bees, good honey stores, and good brood patterns. Those colonies were just not very interesting. (Grins) BC

Dr. James E. Tew, State Specialist, Beekeeping, The Ohio State University, Wooster, OH 44691, 330.263.3684; Tew.1@osu.edu; http://beelab.osu.edu/

American Chestnut Trees



Making A Come Back? We can Only Hope.

Dan Stiles

I have four thriving Chinese Chestnut (*Castanea mollissima*) trees on our remote property here in the mountains of West Virginia. The tallest is 60 feet and through the eyes of a casual observer, Chinese and American Chestnut (*Castanea dentata*) trees look rather similar. When the trees blossom in late spring (mid-June), our honey bees and many other nectar gathering insects swarm over their blossoms and catkins. I'm sure their loud, constant humming sound would be startling to any beekeeper nearby, because it closely resembles the sound of bees swarming from their hive. Honey bees love Chestnut trees in bloom, and Chinese Chestnut trees are unaffected by the fungus that was (and still remains) so lethal to our good old native American Chestnut trees.

I'm sure some portion of my annual honey crop is the product of Chinese Chestnut tree nectar, combined with numerous other sources of nectar, including autumn olive, tulip poplar, black locust, serviceberry, various fruit trees, honeysuckle, blackberries, clover, and the Lord only knows the sources of the other numerous ingredients. But, whatever the proportion, the end result is absolutely marvelous tasting honey! Everybody loves it! My label says it is wild flower honey, a term that sounds attractive, but we all know it does not accurately describe the container's actual contents. The key question here is, how much of the really nice taste is attributable to the nectar originating from our four Chinese Chestnut trees.

Nearly all the American Chestnut trees were killed by a blight that was accidentally introduced into our country over 100 years ago. The blight is actually a fungus from Asia that in 1904 killed a stand of American Chestnut trees in New York, and then spread south and west in the next 50 years killing essentially all the Chestnut trees in the Eastern United States. Some knowledgeable people estimate that before the blight there were four billion American Chestnut trees growing on millions of woodland acres from Maine to Georgia. It has been said that a squirrel starting in Maine could travel through the branches of American Chestnut trees all the way to Georgia without ever touching the ground. Chestnut trees were by far the most important tree in Eastern forests. Many stories were written about ankle deep American chestnuts on the forest floor and, of course, about chestnuts roasting on an open fire. For some previous 40 million years, it was a very long-lived, fast growing, magnificent American tree.

The American Chestnut Foundation has thus far invested 26 years of research cross breeding blight resistant Chinese Chestnut trees with native, nonresistant American Chestnut trees. The first generation of their cross breeding program produced half American and half Chinese Chestnuts. Over the years these hybrids were bred back repeatedly with pure

American Chestnut stock. In other words, current 2010 seeds will become trees that resemble the pure American Chestnut, but they will contain the Chinese Chestnut's genetic resistance to the blight. They are 15/16th American Chestnut and 1/16 Chinese Chestnut. The truth be known, all concerned *really* hope these trees will be blight resistant, but only time will tell for sure.

I've been a member of The American Chestnut Foundation for many years, and this Spring I was one of the lucky ones selected to receive five "Restoration Chestnut" seeds. I intend to plant my American Chestnut seeds on our West Virginia property where you can be sure they will receive my very best care. Now the question is, what will the honey from American Chestnut tree nectar taste like.

American Chestnut trees in the good old days commonly grew to be 80 to 100 feet tall and had stump diameters of five and sometimes even 10 feet - 16 feet six inches is the known record. Its wood is beautiful, straight grained and long lasting. Many homes and barns were built of chestnut beams and boards in the 18th and 19th centuries. These trees produced a super abundance of chestnuts every single year, unlike the erratic production of acorns by oak trees. They reliably generated train loads of nourishing food for people, as well as terrific Fall and Winter sustenance for dozens of wildlife species including deer, turkeys, bears, and squirrels. And, I assume honey bees also appreciated their nectar and pollen. It is interesting to note that although sprout growth from the roots of the old American Chestnut trees still continue to appear a century after the original Chestnut trees were killed, they too inevitably die of the blight about the time they reach 10 years of age.

With blight resistant American Chestnut reforestation programs soon to become a reality, I would think many foresters, wildlife managers, beekeepers and others should be aware that dramatic changes in the world of natural resource conservation are looming just over the horizon. Millions of American Chestnut trees restored to their original range in the Eastern United States will surely change the way we all do business. But, I don't believe anyone knows, nor could I find any records, about how the honey produced from pure American Chestnut tree nectar will taste.

But I can say this. I recently purchased two bottles of expensive honey, one from Greece and the other from France to learn what I could about the taste of Chestnut honey. Presumably both products were representative of the nectar produced by European Chestnut (*Castanea sativa*) trees. The labels say, "Greek honey - bees produced this woody, sweet honey from nectar gathered from Chestnut trees in bloom," and (the English part of) the other container says, "Pure Chestnut tree honey." I asked my wife to taste a half teaspoon of each. She concluded both were awful, along with some other unapproving words. I'm sorry to say we both felt that the taste, appearance and odor reminded us of warm tar in a bottle. But to be fair, a lady currently living in Paris said, "... chestnut honey is one of my favorites. The taste is strong, but for people who do not like it, the taste is a bit bitter."

But, based upon my experience with our four mature Chinese Chestnut trees in West Virginia, I know that some portion of Chinese Chestnut nectar mixed with many other nectar sources does make excellent honey. I rather hope that perhaps the "bit bitter" taste of European Chestnut honey is exclusively a trait of *Castanea sativa* trees.

Before too many years have passed, I feel confident that American Chestnut trees will be back by the millions! Surely some trees will be within the home range of foraging honey bees from apiaries located in the eastern/southeastern States. Let's hope our future forests of blight resistant American Chestnut trees will be a new source of excellent honey as well as timber, and a dependable source of healthful food for people and wildlife!

Fifty years from now when my five American Chestnut trees are seventy five feet tall, my grandson's honey bees will be bringing in American Chestnut nectar. I'm betting his bees will make marvelous honey too. BC

Dan Stiles is a retired wildlife biologist in West Virginia.

BEEKEEPING IN THE NORTHEAST

Nine States, Diverse In Many Ways, And Similar, Too.

Ross Conrad

The Northeastern United States, composed of Pennsylvania, New York, New Jersey and the six New England states to the north and east are diverse and yet share many things in common. This area contains three states that rank among the top ten states with regard to population size (New York ranked 3rd, Pennsylvania ranked 6th, and New Jersey ranked 10th) and three states that are among the ten least populated in the country (New Hampshire ranked 41st, Rhode Island ranked 43rd, and Vermont ranked 49th).

The northeastern states all have a small land mass relative to most of the rest of the country with the largest of the states New York ranked as the 27th largest, and Rhode Island bringing up the rear in the 50th position as the smallest state in the union. The northeast has states that are both densely populated (New Jersey with a population density of almost 1,000 people per square mile) and thinly populated (Maine's population density is only about 37 people per square mile.)

Weather patterns in the northeast feature clear seasonal shifts during the course of the year. As a result, one of the biggest challenges beekeepers face in the northeast is the intense cold and the long dearth of forage that occurs during the Winter months. While all of the states in this corner of the U.S. tend to share similar nectar sources, the availability of each nectar source depends a lot on the level of forest compared to the amount of open and farmed land in each state. The most productive areas in terms of honey production tend to be along the river valleys where the growing season is longer than in the mountains and there are often numerous farms which cultivate large fields of nectar producing plants. One exception to this general statement is the state of New Jersey where the best honey producing areas can often be found near cities where an abundance of parks, large nectar producing trees, and unmanicured lawns provide abundant forage for bees. The least productive areas for honey tend to be densely wooded and located in higher elevations. In the forest covered mountain regions, forage is limited to mostly trees and berries. Since trees don't produce an abundance of nectar every year, ensuring that the bees will have enough honey to get through Winter often requires extensive feeding in these areas.

According to the United States Department of Agriculture (USDA) Forest Service Northeast Forest Inventory, New Jersey is the only northeastern state that has less than half of its land mass covered in trees at 45 percent. Each of the other states are over 50 percent forested with Maine, New Hampshire, and Vermont being the most forested of the northeastern states at 90 percent, 83 percent, and 78 percent respectively. Hives in Maine have to forage on the highest percentage of forest covered territory. This suggests why Maine is ranked last in terms of the average honey harvest in the region, weighing in at an average of 31.3 pounds per hive over the last 10 years according to USDA National Agriculture Statistics Service (NASS). New Jersey is slightly ahead with a 10-year average of 34.7 pounds per honey producing hive.

At the other end of the spectrum, New York leads the pack with a 10-year honey harvest average of 71.6 pounds per hive, while Vermont is close behind with a 10-year average of 70.6 pounds of honey per hive. Pennsylvania's 10-year honey production average is 48.9 pounds per hive according to NASS. Average honey production numbers are not available from the USDA for the four New England states of Connecticut, Massachusetts, New Hampshire, and Rhode Island. These states each have a minimal number of commercial honey producers so the USDA combines their total honey production numbers when calculating production averages in order to avoid disclosing data on individual operations. However, conversations with beekeepers and apiary inspectors in these states

The diverse countryside and small scale farms helps ensure that there is almost always something for the bees to forage on during Spring, Summer, and Autumn throughout most of the northeastern United States.

indicate that the average yearly honey yield that can be expected from a hive tends to fall somewhere in the range of 40-70 pounds.

We have to remember that while the USDA statistics are interesting, they only represent the commercial operations surveyed. Part-time or backyard beekeepers (formerly known as "hobbyists") who produce much smaller quantities of honey, make up the vast majority of beekeepers throughout the northeast and often have significantly worse, and sometimes much better honey harvesting results. The number of part-time beekeepers has grown tremendously over the past three to four years in the northeast. State beekeeping associations and local clubs have generally seen between 30-100 percent growth in membership and class participation in recent years.

This rapid rise in the number of beekeepers has coincided with challenging economic times and has prompted state governments in New York, Pennsylvania, and Maine to cut back on their apiary inspection programs just when demand for such services is increasing. Such short-sighted decision making places greater demand on State and local beekeeping organizations to provide the education and support necessary to help new beekeepers become successful, and prevent widespread outbreaks of disease.

In the northeast, new beekeepers face many of the same difficulties that veterans deal with. Getting the bees successfully through the Winter is the biggest challenge

Bears have become a growing issue that beekeepers must contend with in many parts of the Northeast.

and overwintering success is intimately tied to preventing starvation, and controlling mites and diseases. As a result, the management practices that are applied toward the end of Summer (August and early September) tend to dictate whether the bees will survive the Winter and how strong they will be in the Spring. Generally northeastern beekeepers must harvest their honey crops early enough in August to allow plenty of time to treat hives for *Varroa* and ensure that the bees are healthy enough to raise healthy Winter bees that will carry the colony through the cold season. Beekeepers in the southern-most regions of the northeast can typically wait until the very end of August, or even the beginning of September before harvesting honey and treating for mites.

The most critical part of the honey harvest is overcoming the temptation to take too much honey from the bees and not leave them enough to see them through the Winter months. Unfortunately many beginner beekeepers believe that if they simply don't take any honey from their hives then the hive will have enough food for the Winter but this is not necessarily the case. This is the time of year

Northeast beekeepers share many things in common including the challenge of long cold winters

when the amount of honey stored in the hive and how it is organized should be evaluated. The bees like to store the majority of their honey *above* the brood nest and it is the wise beekeeper that follows the honey bee's natural instincts and ensures that the majority of the honey in the hive in Autumn is located over the brood area. This means that roughly half of the approximately 80 pounds of honey in the hive (a minimum of 60 pounds in southern areas of the northeast and as much as 100 pound in northern regions) is located in the upper-most box and is not mixed in with significant amounts of brood.

If a hive has not gathered enough honey for Winter, and excess honey is not available from another hive to use as feed, it is best to apply feed to the hive in mid-August through early September (probably about the time you are getting around to reading this). Feeding at this time is usually early enough to allow the bees adequate opportunity to process the sugar syrup along with any late season nectar, into Winter stores before the cold settles in for the season and limits the ability of the bees to take in the feed. (To give the bees and extra immune boost, see the recipe for Bee Tea in the side-bar) The other critical detail that beginners tend to overlook is the importance of continuing to feed the bees at this time of year until they have drawn out all foundation into

comb, and filled about 99 percent of all the comb in the hive with honey, pollen, or brood. Leaving large areas of undrawn foundation or unfilled comb in a hive headed into Winter is an invitation for starvation.

Many beekeepers in the northeast also have the additional hurdle of having to prevent damage from black bears. Bear problems seem to be on the increase as black bear populations grow and they are pushed out of their usual habitats by human encroachment. Apiaries in areas that had never had bear issues in the past have encountered troubles in recent years and strapping of hives, electric fencing, or other types of bear deterents are prudent if bears may possibly be anywhere near an area where bees are being kept.

It pays to take the time to learn about the specific conditions in an area before moving bees in so you have an idea of what to expect and can be prepared. Beekeeping in the northeast can be fun and profitable. How much fun and profit you can expect to have with your bees next year depends a lot on what you do during the months of August and September. BC

Many thanks go out to the following individuals who graciously gave their time and shared their experience to help me assemble state specific information for this article: Jeremy Barnes, Dan Conlon, Paul Cappi, Tony Jadczak, Jim Lawson, Chris Rallis, Karen Roccasecca, Tim Schuler, Victoria Smith, and Christopher Tomlinson.

Dancing Bee Gardens Bee Tea

(Based on the recommendations of Rudolph Steiner)

This tea mixture should be used only when the bees are in danger of starvation which in the Northeast U.S. typically occurs in Autumn or Winter (if the hive does not have enough honey stored away), in early Spring if the bees have used up most or all of their stored honey and consistently warm weather and accompanying blossoms have not arrived, or when a colony is shaken onto foundation (such as when hiving a package of bees) and there is no honey stored in the hive.

Unlike feeding plain sugar syrup or high fructose corn syrup, feeding this tea to the bees will not only help prevent starvation, but I believe it will help boost the colonies immune system. Try to plan ahead in late Summer and Autumn and avoid having to feed the bees during the dead of Winter since the bees are not always able to get to the feed in cold temperatures and the addition moisture from the tea may add significant stress to the hive.

Ingredients: All sugar and tea should be from a certified organic source whenever possible. If not organic, use pure cane sugar only to avoid putting genetically modified pesticides into your hive.

Basic Bee Tea Recipe: 16 cups white cane sugar
6 cups hot tap water
2 cups Chamomile and/or Thyme Tea (already brewed)
½ teaspooon natural sea salt w/ minerals (typically not pure white -in color)

Suggested Optional Formula: Use emulsified lemongrass/spearmint essential oil mix (*Pro Health* from Mann Lake Beekeeping Supply or *Honey-B-Healthy*) as a feeding stimulant/immune booster and to prevent fermentation and mold growth in bee tea – one teaspoon per quart (four teaspoons when following recipe above)

Directions:

Add hot water from the tap to sugar and salt

Stir thoroughly (never boil sugar, it caramelizes)

Boil water for tea and add herbs (let steep covered for 10-15 minutes or more)

Strain and mix herbal tea with sugar/salt solution

Mix thoroughly until all sugar is dissolved and fill feeders with tea mixture

Refrigerate unused bee tea

Note: If you decide to add honey to your bee tea, do so after the temperature has dropped to luke-warm and stir the honey in well. Be absolutely sure that your honey source is free from American Foulbrood disease.

Observe how fast the bees are consuming the tea. If they are not taking it down fairly rapidly (at least one pint every two to three days) then they probably do not need it (or it may be too cold for the bees to feed, or the bees have a bad case of Nosema). Only feed the bees when they need it and will take it. The bees should not need to be fed if there is capped honey stored in the hive and daytime temperatures are warm enough for foraging while there is an abundance of blossoming plants available to forage on (unless cold weather is approaching and the hive has not drawn out their foundation and filled up the combs with enough honey to get them through the winter.) Do not feed bees stored tea that has started to ferment. Adding the essential oils mentioned above will help to prevent fermentation and mold growth. Keep containers that you use for feeding your bees clean. Clean feeders thoroughly before reuse.

Natural Standards From Certified Naturally Grown

Is Your Honey Green? These Standards Will Help.

Buddy Marterre
Alice Varon

We all know honey bee health is threatened by pesticides, monoculture crops, in-hive chemical treatments, pests and diseases, and colony collapse disorder, among other things. One result has been a rise in natural beekeeping, regarded by many as the surest way to support the health of honey bees.

Some readers of this magazine have always been natural beekeepers. Terrific. Others have recently taken the natural plunge. Congratulations! But many readers have not. You may not be sure what natural beekeeping entails and whether it is right for you. Recent books by Ross Conrad (*Natural Beekeeping*) and Kim Flottum (*The Backyard Beekeeper*) are a great start. But where do you get advice tailored to your own operation? You've heard what *not* to do (use synthetic chemicals), but how do you quit? Seriously, you ask, how can your hives survive without pharmaceutical assistance? It seems risky.

Suppose you make the switch to natural beekeeping and all goes well. Your hives thrive. You feel good, the bees do great. But beyond a sense of satisfaction, are there any rewards for the beekeeper? Is there a way to convey the value of your natural methods and gain a premium for your honey? Is organic certification an option? Until this year, the answer to these questions was "no" for most beekeepers.

The National Organic Program (NOP) doesn't define standards specific to organic beekeeping. (The National Organic Standards Board (NOSB) Apiculture Task force submitted recommendations in 2001, but they were never adopted.) Some certifying agencies accredited by the NOP have developed their own beekeeping standards, but they tend to be accessible only to the few beekeepers with thousands of acres of organic land surrounding their hives. Farmers and beekeepers may describe their operations and products as organic only if they're certified by a NOP-accredited agency (or if they sell less than $5,000 per year). Uncertified beekeepers who use "organic" to describe their apiary or hive products risk fines of up to $10,000 per day, per violation. What's a natural beekeeper to do?

The Solution

One of us (Buddy) was very frustrated by this situation. A year and a half ago, he contacted the Director of a non-profit organization called Certified Naturally Grown (that's Alice, the other author). Together – and with the help of many expert beekeepers from across the country – we drafted standards for natural beekeeping. Thus was born Certified Naturally Grown's Apiary Certification Program – the only program of its kind in the country.

The development of an apiary program came, well, naturally for Certified Naturally Grown (CNG). The organization was founded in 2002 by small-scale, direct market farmers as an alternative to the USDA National Organic Program. CNG uses a Participatory Guarantee System (PGS) model of certification. It is fully committed to recognized organic practices but distinct from third-party certification programs like the NOP. Instead, it uses a peer-review inspection process. This helps minimize inspection fees and paperwork. Perhaps best of all, it fosters local networks of farmers and beekeepers. Today more than 800 farmers in 48 states are enrolled in the CNG program, which keeps growing every year.

Local networks are especially valuable for beekeepers, given the knowledge-intensive nature of beekeeping. The peer-review certification model is a good fit too, since nearby beekeepers are most familiar with the type and timing of local pest and disease pressures. Beyond doing an inspection, they might have welcome advice, or benefit from some tip you share with them.

CNG employs a streamlined application process. Apiary applications are completed online. An annual contribution is required to remain in the program ($50 - $175 is recommended) but it's up to the beekeeper to determine the exact amount. A hallmark of CNG is transparency. Certification documents for every CNG member ➢

"Once certified, you can use the name, logo, labels and promotional materials"

are available to the public on the member's online profile, hosted by the CNG website (**www.naturallygrown.org**). The site also includes a searchable map of all certified farms and apiaries, which makes it easy for members and customers to find area beekeepers.

The Apiary Certification Program

The primary purpose of CNG's apiary certification program is to improve the health and welfare of honey bees in America. The program helps achieve this goal by 1) providing detailed guidance on best practices; 2) strengthening the natural beekeeping community by encouraging the formation of local networks of mutually-supportive, information-sharing natural beekeepers; and 3) creating a financial incentive for beekeepers to adopt natural methods, insofar as certification helps beekeepers charge a premium for their honey.

Many beekeepers don't need the financial incentive and are just looking to be part of a local community of beekeepers. Welcome! Indeed, natural beekeepers are encouraged to participate in local networks whether they're certified or not.

For those who do have a financial incentive, CNG has a lot to offer. It helps with the marketing of natural honey by offering attractive labels for your product, promotional materials and marketing advice, and the prestige of affiliating with a well-respected national program.

The standards are tailored for beekeepers with between three and 300 hives – ideal for backyard beekeepers and sideliners. Commercial beekeepers are also welcome, though it may be difficult for a large beekeeping operation to adhere to the certification standards.

The CNG Apiary Standards are more than a set of rules and regulations. They offer practical suggestions on how to manage your colonies with minimal or no chemical exposure. For every facet of beekeeping, the standards not only define what is required and prohibited to remain certified, but also gives recommendations as to how to meet the standards. Beekeeping practices are categorized as Required, Recommended, Permitted, or Prohibited. The standards are strict but quite doable. For those moving away from synthetic treatments, the standards include a transition table that lays out the timeframe and steps needed to achieve full certification.

The standards cover the following topics: apiary location, hive position, hive construction, frames, foundation and brood comb removal, frames and foundation in honey supers, queen and bee sources, supplemental feeding, honey removal, processing and labeling, wax processing, hive and frame storage and transfer between colonies, moving colonies, colonies engaged in pollination services, hive transition, and record keeping. A comprehensive list of allowed and prohibited substances is included in the certification guidelines, posted online at **www.naturallygrown.org/apiaryprogram**.

Supporting the Movement

With a grant from the USDA's Farmer's Market Promotion Program (FMPP), CNG is developing marketing materials and providing educational workshops to support beekeepers interested in natural practices. The grant has enabled CNG to offer in 2010 two sets of educational workshops on natural beekeeping in North Carolina and southern Virginia (supported by the North Carolina State Beekeepers Association and the Virginia State Beekeeper's Association). When completed, these workshops will have educated nearly 400 beekeepers. The marketing materials will be available to all natural beekeepers in August, 2010.

The Certification Process

Details on how to get certified are on the CNG website **www.naturallygrown.org/apiaryprogram**. In keeping with our grassroots model, you'll find a little twist: before applying, you'll need to identify at least two other members of your "local network." These could be from a formal network like a county beekeepers association or from an informal network of beekeepers in your area.

Completing the application should take no more than 15-30 minutes. You'll be contacted by CNG within three to four weeks of receiving your application. If it is accepted, there are a few more steps to complete certification:

1. Return a signed one-page declaration indicating you understand the standards and won't market as CNG any non-certified hive products, among other basic agreements.
2. Send a financial contribution. CNG recommends contributions of $50 - $175 to help keep the program running, but it's up to each member to determine the exact amount.
3. Arrange your apiary inspections. Two inspections per season are required. Inspections can be carried out by beekeepers that you know. At least one should be someone in your local network.
4. Inspect another CNG apiary (if there is one in your area). This is the "participatory" part of the Participatory Guarantee System and can be a great benefit, as it provides an on-site opportunity for natural beekeepers to learn from one another.

Once you are fully certified, you will receive a certificate in the mail. You may use the Certified Naturally Grown name and logo, and purchase labels and other promotional materials. You'll have an apiary profile on the CNG website, which you can customize with descriptive text, photos and other images.

But it might be that the great value of the CNG apiary program, and the reason many beekeepers have chosen to participate already, lies in the learning opportunities and sense of camaraderie that it fosters and strengthens among natural beekeepers. In the face of daunting environmental challenges, it can be inspiring to join with others who have chosen to use natural methods to try to heal and strengthen the honey bee population. BC

Buddy Marterre is a NCSBA Master Beekeeper. He has been keeping bees for eight years. He has educated over 350 new beekeepers in Forsyth County, NC over the last six years.

Alice Varon, Executive Director of Certified Naturally Grown, just started keeping bees in 2010. Contact her at alice@naturallygrown.org.

Building, Managing & Using A TOP BAR HIVE

Top Bar Hives Work With The Concept Of Bee Space With Moveable Combs, But The Combs Are Free Form And Not Contained

K. Ruby Blume

I am one of those people who never intended to become a beekeeper, and certainly not a top bar beekeeper. A box arrived in my yard and I didn't think much about it, until gradually and increasingly the magic and elegance of both the bees and the top bar system grabbed me by the ears and drew me in.

It was 1996. I had been an urban gardener for a few years, and was building my second garden from scratch, trying to work the rich dense soil we called East Bay Clay down here in the flats of Oakland, California.

A friend approached me at a Do-It-Yourself Skillshare event and asked if I had any interest in hosting a beehive in my yard. I had never considered it before, but why not – I had a double sized lot with plenty of room. Two days later a couple scruffy looking individuals dropped off a handmade plywood box. I was moderately curious, but not so much that I ran out and bought 10 beekeeping books. I did however insist that they let me know when they would be coming to manage the bees so I could see what it was all about. After two or three sessions, these folks pretty much disappeared, abandoning their hive to me along with a worn, many-times-copied-over book, a hand-sewn stained veil with a beat-up straw hat, a second-hand smoker and a piece of metal that sometimes doubled as a hive tool.

Now 15 years later, I am still using the book, Curtis Gentries *Small Scale Beekeeping* and my bee library has expanded to a full shelf in my bookcase. My equipment is slightly less bedraggled, my boxes are cleanly assembled and my tools lovingly forged by my own hand. I have become one of the local – and perhaps national – promoters of the top bar system, a simple technology, beneficial for bees and beekeeper alike and well suited for backyard and small scale apiaries.

To their credit, the folks who brought me the hive did eventually show up again and for a short while we worked together as an informal collective, managing a half dozen top bar hives around town. Several years into this we also managed some Langstroth hives at a local community garden, so I got the opportunity to see what I was missing and to compare the two systems. I quickly saw that in spite of the majority stamp of approval, the Langstroth is definitely not for me! I struggled with the heavy supers, broke the delicate frames and dealt with mite populations out of control. I am not saying top bars are not without their challenges, especially if they are not what you learned on, but for me personally, the benefits far outweigh the challenges, most of which any experienced beekeeper can handle.

The Box

The top bar system, also called the Kenyan Top Bar System (KTBS) was developed by the Peace Corps as a low input cottage industry for African villagers. Like Langstroth boxes, top bars work with the concept of bee space and have moveable combs, giving the beekeeper the most possible flexibility in management and harvesting. Unlike the Langstroth the bees build "free form" off a horizontal bar, which is fitted with a comb guide, to show the bees where to get started. The bees then fill the space to capacity, and the finished combs, or paddles as I call them are shaped like the inner dimension of the box.

Top bar hives are typically "DIY." You can sometimes find them pre-made for sale but usually they are designed and built by the beekeeper from inexpensive materials, with a minimum amount of tools or fine carpentry skills required. A table saw, a chop saw and a drill are all it takes. Because the only limiting factor is having the right bar width to maintain bee space, the results can be intriguing, elegant, or occasionally pitiful. The worst example of a top bar hive I have seen was a set of bars laid across an aging Styrofoam cooler. And one of the most ingenious designs comes from top bar beekeeper Les Crowder of New Mexico. He had a free source of 55-gallon food grade plastic drums and cut them in half horizontally for his hive bodies. The paddles of comb from these boxes are lovely half rounds. And because of his

Bees hanging as they build free form.

Swarm crawling into top bar hive.

thrifty re-use of materials each hive cost him about $3 to construct. If you look around on the internet, building plans for top bar hives abound. Many are more complex than they need to be, with peaked roofs, screened bottoms and complex angles to cut. Others like mine, are bare bones basic. Find a design that appeals to you and that fits your building skills level, or get creative and come up with your own design.

The boxes can be pretty much any depth and length, though for optimal honey and brood production somewhere between 27 and 34 bars (40"-48" in length) and 8"-12" deep seems to work well. The slope of the sides can vary, from the straight-sided Tanzanian top bars, to the steeply sloped sides of the New Mexico style hives. A steeper angled, shallower box helps limit comb breakage which can be an issue in warmer climates. Here in our cool coastal climate where this is not an issue the boxes I build are 12" deep with 105° angle to the sides.

For materials I use ¾" exterior grade plywood for the body of the box and solid pine for the bars. I have never had any problem with plywood and toxicity though I do understand there are issues with the process and materials used to create plywood. If this is a concern, pine board is a good option. Of course you would never use pressure treated wood.

The entrance can be low or high depending on your preference. The boxes I build have bottom entrances, so I screw a 1" bar across the top of the front end before setting the top bars down – this maintains the bee space between the front of the box and the first bar. If you want a top entrance, just set your first bar down ½" from the front end of the box.

Top bar hives benefit from good ventilation, both Summer and Winter. Because the bars themselves function as a lid, condensation can build up inside, especially in the Winter. One easy way to offer ventilation is to inset a piece of ¼" hardware cloth 2"-4" wide between two bars towards the back of the hive, creating good cross flow inside the box.

Coming up with a stand for your top bar box is optional, but essential for body comfort and ease of working. You can build one from 2" x 4"s, scavenge a used table with metal legs or if you have the resource, craft one from metal. Many top bar hives are designed with legs permanently attached, but if you ever need to move your hive in a vehicle, this makes this process more painful. Whichever you choose, make sure the legs of your stand sit as wide as the top of your box for stability and that it puts the top of the box at waist level for ease and comfort in working the hive.

While there is a lot of room to get inventive with your design, the lack of standardization can also be a downside; it is an exercise in frustration to take splits and switch out brood between boxes of different dimensions. Here in Oakland I have the benefit of having taught many people the system, and so have widely distributed my own hive plans. I also started a listserv so local top bar beekeepers have a way to get in touch with each other. This insures that we can always split, join and borrow brood from a fairly large pool of local backyard beekeepers. If you are on your own, it is always best to build at least two boxes and a nuc the same size so that you can switch things up, at least within your own apiary.

As well as the flexibility and low cost of building a top bar hive, the system offers other savings of time and money. There are no frames to repair or rewire, no foundation to replace. You don't need to buy or rent an extractor (see honey harvest) and for the most part a smoker is optional as well. Added benefits for the beekeeper include the invaluable ease on the body. You never lift a heavy super firmly stuck to the box below with propolis; you only ever lift one paddle of comb at a time.

Benefits for the bees

Let the bees build what they want? Absolutely!

I believe that less is more in terms of manipulating the activities of the hive and my attitude is one of bees as an incredibly successful species that knows exactly what to do to thrive. It would be arrogant to think I know better than they how to run the colony or what population they need for the upcoming nectar flow and thus I have chosen natural beekeeping with minimal use of commercial or chemical inputs. I don't use miticides, antibiotics, GMO soy feed, clearing agents for harvesting or really much of anything but my body and my brain.

One of the biggest benefits of the top bar hive for the bees is that they are allowed to build comb naturally. If you have never seen natural comb I can assure you there is much to learn from it. It all fits together perfectly and yet, here you see the cells for honey storage and there a subtle shift to brood cells, over here they built some drone cells. Not only can they build what they need, they build in the natural size.

Commercial foundation manipulates brood cell size making it nearly a half a millimeter larger than what the bees build left to their own devices. In an unfortunate twist of nature, the life cycle of the *Varroa* mite also takes place in those cells. With a bigger brood chamber there is also more room for mite reproduction, which the natural cells do not offer. Don't get me wrong, I have heard of top bar hives with *Varroa* infestations. But while I have struggled with various issues as a beekeeper, mites have not been one of them. The only time I gained significant experience battling mites was the year I managed those Langstroth boxes. This simple fact, that natural cell size inhibits mite reproduction is corroborated by other top bar beekeepers. Small cell foundation, which mimics natural cell size, is finally getting its due. But this said, for the small-scale beekeeper, where profit is not the bottom-line,

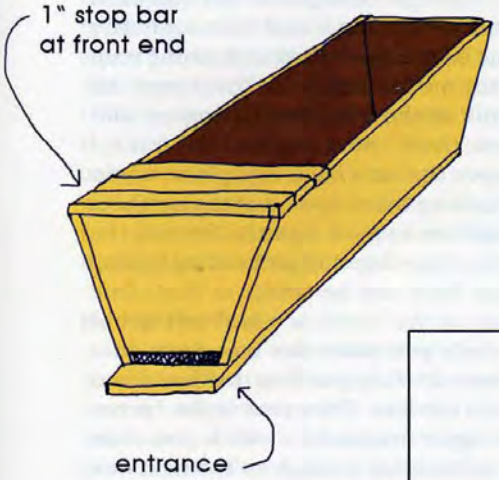
Kenyan Top Bar Hive

East Bay Basic

courtesy of www.sparkybeegirl.com

K. Ruby Blume

Dimensions in inches based on 3/4" plywood for a box with 26 bars
cut all pieces. assemble four sides of box upside down with wood screws. attach bottom of box with overhang on entrance side. attach 1" stop bar to front end.

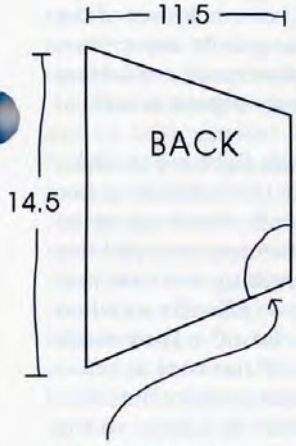


LID (optional)
18 x 43

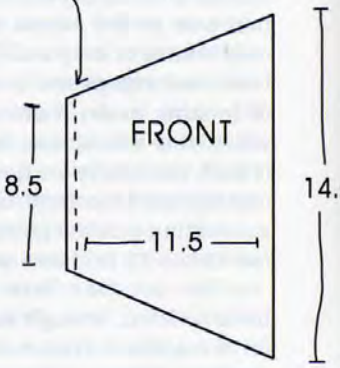
if you don't ever need to transport your hive, a sheet of plywood will suffice to keep rain off. Otherwise add a 1x 2 lip around the edge that will sit down around the top bars, Add a tie down strap and the bars will be fixed into place and ready for transport.

SIDE
12 x 39-1/4

cut 1/2" off the bottom of the front end piece for the entrance

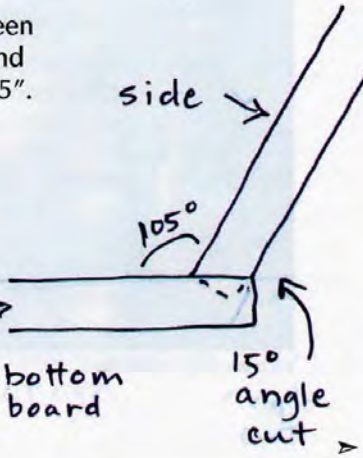


BOTTOM
10 x 40-1/4

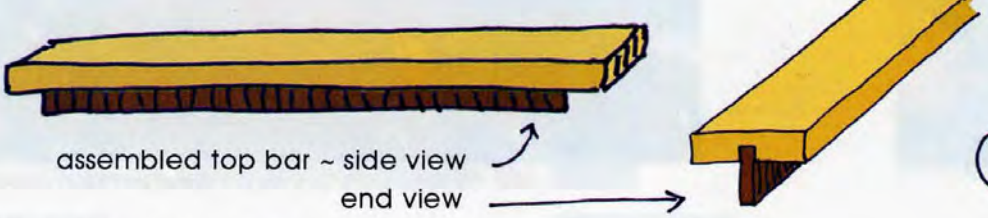


SIDE
12 x 39-1/4

for extra clean assembly cut 15 off bottom edge of side pieces with table saw



Cut top bars from solid wood. They should be 16" long, at least 3/4" thick and between 1-3/8" and 1-1/2" wide. Use a 1/8 inch wide saw blade to cut a groove 1/8" wide and 3/8" deep down the middle on one side. Cut guide bars from 1/8" plywood 1" x 13.5". Affix guidebar into groove with a few drops of wood glue.



Lack of standardization can be a downside for making splits, building up weak colonies or switching frames.

there is simply no reason not to let the bees build naturally. It can easily be done inside a Langstroth box as well. Just leave off the foundation.

Management

One myth about top bar hives is that they are difficult to manage. Broken comb, bridge comb and building perpendicular to the bars are things that no one wants to deal with. There are some simple prevention methods that are easily adopted. Certainly the top bar system is a bit more "hands-on" than not. You wouldn't want to plunk a new colony in a box and ignore it for three months. This would be sloppy top bar beekeeping. It is best to manage your top bar hive every two to three weeks during buildup, nectar flow and honey flow. For this reason the system is well suited to the backyard beekeeper who has one to five boxes and who not only wants to keep a close eye on the bees, but enjoys the bi-weekly ritual of looking in on them and learning what they are about. As a beginner it took me nearly an hour to manage one top bar hive. Now, unless there is something serious going on, it takes me about 15 minutes per box.

The top bar hive is managed back to front, though some folks opt for a middle entrance on the side of the box, which makes things a little different, as bees arrange themselves inside the box based on the entrance. With the end entrance, I start at the back end, pulling off three or four bars to make a gap. I then start to detach and lift the bars one at a time to examine them. The back end of the hive is where the honey stores are, so I can first get a sense of how the honey production is going. If they are full up and running out of room I am prepared with my bucket to do a harvest. After the honey stores I work through the brood chamber. At the front end are one to two combs with food stores. This is the regular arrangement in a horizontal hive and has the benefit that the bees are free to expand the brood chamber as they see fit, without the need for a queen excluder. Once the brood chamber ends, the back end of the hive will be full combs of honey.

My 17″ hive tool is used to detach comb from the sides of the box. Regular management in this manner is beneficial and eventually the bees give-up on attaching, so that the older combs are more easily lifted out. The tool is then inserted between two bars and the bars are separated with a twisting motion. Handling of the bars is more specific than with a Langstroth frame. It is important to orient them to the ground to prevent breakage, especially with paddles full of honey, but the sensitivity to this is easily gained and quickly becomes second nature. Combs do occasionally break and can be repaired by stapling them back onto the bar with a sling of netting. I always have netting and a staple gun handy in my kit. If done well, the bees reattach it within a matter of days. The back end of the box can be used to set bars that may need to be removed or moved around for any reason. Having a nuc sitting on the ground next to the hive can also serve this purpose.

As I go through the box I lift each comb, examine it and then set it into the back end of the box, flushing it up with the bar before it. This keeps the bulk of the bees from flying up and out. Once I have reached the front, I move the bars back into place, again flushing them up and pressing them together to get a tight fit. Setting the bars close together without squishing any bees can be tricky at first. One way is the "flush & slide" method in which you slide the bar down into place, literally pushing the bees down into the box. The other is the "press & jiggle" method in which you slide the bar close enough to the next one that you make contact with bee bodies, then gently jiggle the bar back and forth so the bees move out of the way. As in working with any critter, having a sense of purpose and letting the bees know your intent is critical for success.

I do sometimes light my smoker, but in this system there is little use or need for smoke. It makes no sense to smoke just the two exposed paddles at a time and smoking the hive just at one end is not as effective as when you remove the lid of a Langstroth hive and smoke all the bees at once. On the other hand, you are only disrupting one paddle at a time, so the bees tend not to get very agitated. If they do, I spray them with a little

Harvesting buckets.

A full paddle of honey.

sugar water, or just step away for a moment.

To prevent cross comb and to cycle out old comb I insert blank bars in one or two spots during the build up and boom of the season. In the Spring I take splits as well as opening the brood chamber with empty bars to help prevent swarming. Later in the season I generally insert one empty bar close to the front of the brood when I manage. If they are building like crazy in the back end of the box I also insert a blank bar between the last two full straight ones. Since the bees will always fill in before they build more at the back end, and they will always maintain bee space, this insures good straight comb.

Honey Harvest

If you are somewhere with a good sized honey flow, you'll have to harvest a bit more often to keep the back end of the hive open for more production. Since you'll be managing the hive every two to three weeks anyway, and since harvesting the top bar is a simple task this does not add much more to the workload than a usual day of hive management.

Harvesting a top bar hive requires little special equipment. My harvesting set up is two five-gallon food grade buckets that sit one on top of the other. Square ones work better than round, since you can easily offset them to stack one on top of the other. The top bucket has holes drilled in the bottom with a screen and a lid, to keep the bees out during harvest. To harvest I pull full bars of honey, brush off the bees, and cut the comb into the bucket. Processing consists of mashing up the comb and gravity does the rest. Those critical of the system say it is a waste or loss that the comb is destroyed and the bees have to build it new every season. For the small-scale beekeeper who is content with healthy bees and 55 pounds of honey rather than 60, the loss is negligible.

There are also some clear benefits to this method. If you have inserted blank bars in the front of the hive all season long, some of the older comb will be cycled out when you harvest, preventing build up of pathogens and pests. It limits the number of combs that sit unused in the hive getting moldy or brittle over the Winter. And of course there are no sticky messy frames and supers to store. Harvesting in this way gives you a plentiful supply of wax, a useful and valuable hive product. Finally for the backyard beekeeper there is the simple benefit of not having to obtain an extractor or go through the laborious process of cleaning it – hardly worth it for one or two hives anyway.

Fall and Winter With the Top Bar

In terms of wintering, the top bar hive is much like any other. Here in coastal California there is no need to do any real weatherizing. I do a final inspection after the last honey harvest, making sure they have enough reserve stores and then close the box for Winter. I leave the ventilation screen on and cover the bars with a lid to keep the rain off. In other climates you would treat your top bar hive much like any other, if you like follower boards just cut them to the inside dimension of your box. If you wrap your boxes with paper or insulation, you'd do that for your top bar hives just as you would your Langs.

Here in California we have forage all Winter long, and plenty of days where it is warm enough for the bees to fly, so there is no great need to feed, though I try to have a look in on a sunny day mid-January to make sure they still have some resources. If you live in a colder climate it is important to make sure the clump of bees is all the way to one end of the food stores inside the box when you close it up for the Winter. This way they move across the bars using up the food as they go. If they are in the middle of their store when winter starts they may stave.

If you do Winter or early Spring feeding, there are several options. A standard entrance feeder works fine. You can also feed inside the box by scattering granulated sugar on the floor of the hive or laying a ziploc baggie full of syrup inside. For the latter, just prick pinholes in the baggie once it is lying flat and the bees will crawl over it and lap it up.

Honey harvest.

Summary

The top bar system may not be for everyone, but it deserves recognition as a viable, elegant and appropriate technology. In most of Africa it is the dominant beekeeping system and it is gaining popularity among natural beekeepers in the states as well. Besides myself there are several other beekeepers who heavily promote the system including Michael Bush of Nebraska who has a wealth of top bar information on his site (Google bush bees) and Les Crowder of New Mexico who keeps over 150 top bar hives in his apiary. You can find information and support on the top bar forum at beesource.com, and *Small Scale Beekeeping*, the only book I know which deals specifically with managing top bar hives is also available in its entirety online.

The top bar system of beekeeping encourages us to be resourceful and inventive, while at the same time puts us in the attitude of learning what the bees have to teach us, by observing their natural strategies inside the hive. If you have been eyeing it warily, I encourage you to build a box and try it out before making up your mind. Most importantly we must encourage all forms of responsible beekeeping and continue to learn from each other and through intimate observation of our bees. BC

K. Ruby Blume runs the Institute of Urban Homesteading in Oakland, California. She teaches beekeeping, gardening, mead making, and other sustainable skills. Contact her at IUH@sparkyBeegirl.com.

NATURAL REMEDIES

Prickly Ash, Alexanders, Alder Buckthorn

Abbas Edun

SOUTHERN PRICKLY ASH

Xanthoxylum clava-herculis is a small to medium sized tree or large shrub in the rue or citrus family, Rutaceae;[1] it is also known to botanists as *X. macrophyllum.* Some of its common names are Angelica Tree, Pepperwood, Pillenterry, Sea Ash, String-a-tong, Suterberry, Toothache Bush or Tree, Wait-a-bit, Wild Orange, Yellowwood and Hercules Club.[2]

Southern Prickly Ash is a native of the southeastern United States, and is found in Alabama, Arkansas, Kentucky, Louisiana, Mississippi, Texas and West Virginia, and as far north as the southern parts of Virginia and Oklahoma. It grows along river banks and fence rows, at the edge of dry woods, in hammocks, thickets, coastal areas, and sand dunes, and in the understorey of moist forests. In the south of Florida it is confined to barrier islands and sandy hills north of the Miami River.

The tree requires a well-drained sandy soil with organic content, a lot of water until it is firmly established and full sun or partial shade. It does not tolerate long-term flooding by brackish or salt water.

It has a rounded crown and may be as tall as 40 feet (12 m.); the diameter of the trunk can reach up to 10 inches (25 cm.). The twigs are stout, green changing to greenish-brown, hairy when young, with sharp, short, scattered, thick spines often in pairs. The light gray bark is unusual, with smooth, thin, corky, pyramidal, verrucose projections, each capped with a large thick spine.

Prickly Ash

The leaves are very tardily deciduous or evergreen, pinnately compound, glabrous, leathery and slightly falcate. There are between five and 11 narrowly elliptical to lanceolate leaflets with round-pointed teeth, shiny dark green above, paler below.

The rather inconspicuous, greenish-yellow flowers, each with three to five petals, are borne in terminal panicles up to eight inches (20 cm.) long.[3] They bloom in the spring before the leaves emerge, are highly aromatic and attract honey bees and other insects. The female flowers, after pollination, give rise to clusters of rounded, reddish-brown, two-valved follicles that mature late in the Summer; they have a rough surface, each containing one or two shiny, black seeds.

Southern Prickly Ash contains the two lignans asarinin and sesamin, as well as resins, tannins and an acrid volatile oil. It was a highly coveted herbal remedy in North America, traditionally used for numerous conditions, including toothache, rheumatic pain and cramps. A salve of the grated root mixed with whiskey was rubbed on swollen limbs as an orthopedic aid by the Houma Indians of Louisiana.

The Merck index of pharmacological agents[4] states that the compound known as xanthoxylum is found in the bark of the tree which is also noted for its isoquinoline alkaloids, including acetylanonaine, candicine, chelerythrine, lauriflorine, magniflorine, nitidine and tembertarine. Xanthoxylum operates to strengthen the venous cellular structure and, more particularly, to improve the capillary integrity of the veins and arteries. Therefore, the bark can be advantageously employed in the treatment of a broad spectrum of vascular disorders[5] which involve the atrophication or hardening of veins and arteries.

The bark is also a highly regarded non-enervating stimulant that is often used,[6] in low doses, to move other herbal remedies[7] throughout the body, and it can give relief where muscle tension has led to the development of rheumatic symptoms. It is particularly helpful in relieving chronic musculo-skeletal problems such as fibromyalgia, and will benefit persons with conditions such as carpal tunnel syndrome, hemorrhoids and intermittent claudication.[8] The seeds contain concentrated amounts of the isobutyl amides herculin and neoherculin, which cause the characteristic tingling sensation on the tongue.[9]

Southern Prickly Ash is contraindicated in pregnancy because of its stimulation of menses. It should also be avoided by mothers while they are breast feeding.

ALEXANDERS

Angelica atropurpurea (called Hog Weed) is commonly known in the United States as Alexanders, a name which is also used to identify another related plant, *Smyrnium olusatrum.* The aim of this article is to provide the reader with some interesting facts about the latter.

Alexanders is a monocarpic biennial, or perennial herbaceous plant in the carrot family, Apiaceae (Umbelliferae).[10] Some of its other common names are Alick, Black Lovage, Black Potherb, Esmirnio, Hell Root, Horse or Macedonian Parsley, Maceron, Megweed, Skit and Wild Celery.

Smyrnium olusatrum is native to the Mediterranean region.[11] It was introduced to Britain by the Romans, and now grows in the north of England and central Scotland.

Alexanders (Smyrnium olusatrum).

The plant is abundant in the area around Alexandria, and in Macaronesia, especially the Canary Islands.

Alexanders grows in hedgerows and woodland gardens, on cliffs, banks and waysides, near roads and ditches and on unused land. Although wild populations of the plant grow abundantly in salt marshes and uncultivated land near the sea, it succeeds well in most soils but prefers an open sunny position in a moisture-retentive soil which is well-drained. The plant can tolerate strong winds but not maritime exposure. It is hardy to U.S. climatic zone six, and may be grown where Winters are not severe; prolonged frost discolors and kills the leaves.

A stout stem up to five feet (150 cm.) tall grows from a thick, elongated root. The leaves are alternate and pinnately or palmately compound; they are divided into three or more dark glossy green leaflets with wide, shallowly toothed lobes.

The plant blossoms during May and June with small, greenish-white, hermaphrodite flowers in umbels which have seven to 22 rays. The flowers have a mildly sweet scent similar to myrrh which attracts honey bees and other insects.[12] As it blooms earlier than most plants in the carrot family, Alexanders provides nectar in the Spring, at a time when the first larvae may be nutritionally stressed as the hive struggles to expand; it supplies enough food for their development.

The fruit is a black, didymous schizocarp.[13] The seeds are highly aromatic with a myrrh-like scent, notably quite large (one third of an inch) and utterly black.

Alexanders is especially acrid or pungent, and one of its main effects is to disperse and circulate stagnant or blocked blood, and to clear out obstructions in the acupuncture meridians. It has been used medicinally for a very long time: Theophrastus made reference to it, [14] and, according to Dioscorides, the seeds were often soaked in wine and used as an emmenagogue.[15]

During the Middle Ages, the root was said to have aperient, anti-asthmatic, depurative and mildly diuretic properties;[16] it was also used to relieve dropsy or edema. The most outstanding quality of the plant, however, was its use as an antiscorbutic tonic, the leaves being rich in vitamin C.[17] The fruit is carminative and stomachic; it contains an essential oil, cuminal, which is reminiscent of cumin. The crushed leaves or their juice is a soothing and healing treatment for cuts and minor abrasions.

ALDER BUCKTHORN

Rhamnus frangula is a large shrub or small to medium sized tree, seldom over 12 feet tall, in the buckthorn family, Rhamnaceae; it was also known to botanists as *Frangula alnus*. Some of its common names are European Alder or Fen, Glossy or Breaking Buckthorn,[18] Black Dogwood, Bourdaine, Faulbaum.

The tree or shrub grows throughout Europe, including Britain, Scandinavia south and east to north Africa, the Urals and Siberia.[19] It is hardy to USDA Zone three, and is found in Illinois, Minnesota, New Jersey and Tennessee. In Indiana, it grows primarily in the northern third of the state, and in Canada, east of the Great Lakes and in the prairie provinces.[20]

It does best in a moderately fertile, acidic and peaty soil, but not a calcareous one.[21]

It flourishes in swamps and damp places, usually in moist heaths and open woods.[22] Fens, upland forests, sedge meadows, wet and mesic prairies, and swamps may have *R. frangula* growing in their understorey.

Alder Buckthorn is a deciduous broadleaf which has an extensive, shallow root system to capture water quickly; it most often grows at a slow rate as a multi-stemmed shrub, having a few to several stems from the base. The shrubs have spreading, loosely-branched crowns. The stems have bark that is gray to brown with prominent, often elongate, lighter-colored lenticels. They can attain a height of about 15 feet (4.5 m.), and may be just as wide. In the form of a small tree, it is single-stemmed and may be somewhat taller than the shrub.

The greenish brown branches have elongate lenticels and may be slightly pubescent. A dissection of the stem reveals a distinctive yellow sapwood and pink to orange heartwood. The leaves are simple, alternate, and one to three inches (2.5 to 7.6 cm.) long; the margin is entire, and they are dark glossy green above and a lighter shade and sometimes pubescent below.

The tree or shrub blooms from the second week of May to early July; the small flowers are greenish-white and have five petals; they are hermaphrodite, entomophilous, incompletely protandrous and remain for about eight to10 days,[23] but pollen transfer occurs only on the first three days. A very weak, pleasant odor along with nectar and pollen attracts honey bees and other insects. The fruits are small, red, globular berries which become dark purple from September to November when they are ripe.

Alder Buckthorn has been used medicinally as an aperient from the Middle Ages, and probably before that

Alder Buckthorn

time. The bark contains a small amount of anthraquinones, which act on the wall of the colon; it is used as a laxative for chronic atonic constipation as it stimulates a bowel movement approximately eight to 12 hours after being steeped in wine and taken internally.[24]

Anthranols and anthrones are also found in the bark; they induce vomiting, but the severity of their effect is greatly diminished when the bark has been dried and stored for at least a year before being used. It is harvested early in the Summer from the young trunk and moderately sized branches. The inner bark is cathartic, laxative, tonic and vermifugal.

A hot tea made from the bark induces perspiration and lowers fever. It is also useful in the treatment of abdominal bloating, cirrhosis of the liver, colic, dropsy, hemorrhoids, hepatitis, jaundice, and gall bladder complaints. Externally, an ointment made from the bark is effective for treating scalp infestations, gum diseases, minor skin irritations and warts. BC

Abbas Edun has been keeping bees in Ontario, Canada since 1979.

References:

[1]All of the members of this family possess aromatic and pungent properties.

[2]*Aralia spinosa* is also commonly known as Hercules Club.

[3]Southern Prickly Ash is dioecious, the male and female flowers appearing on separate trees.

[4]The **Merck Index** is an encyclopedia of chemicals, drugs and biologicals with over 10,000 monographs on single substances or groups of related compounds.

[5]Including varices, more commonly known as varicose veins. They comprise elongated, protrusive, inoperative, and often spider-like blood vessels, usually occurring in the legs, and frequently, after pregnancy. See U.S. Pat. No. 5955085 by Terry, James M. and Richard R. Rathmann (1999) entitled "Method for the treatment of varicose veins using xanthoxylum from a Southern Prickly Ash tree."

[6]The bark has a stronger stimulative action than the berries.

[7]E.g. Meadowsweet (*Filipendula ulmaria*) and Cramp Bark (*Viburnum opulus*).

[8]Pain in the fibrous tissues of the body, such as muscles, tendons, and ligaments is known as fibromyalgia. Claudication means cramps in the lower leg while walking.

[9]Tingle Tongue is another common name of the tree. Neoherculin is an alkyl amide which is identical to the one called echinacein, found in Purple Coneflower (*Echinacea angustifolia*).

[10]Monocarpic plants are those that flower, set seeds and then die. The term was first used by Alphonse de Candolle, the renowned Swiss botanist. *Angelica atropurpurea* is also a member of the carrot family.

[11]See Vavilov, Nikolai. 1951. *The Origin, Variation, Immunity and Breeding of Cultivated Plants.* Translated by K. Starr Chester.

[12]Although the plant is self pollenizing, outside pollinators are actually required.

[13]Didymous: arranged or occurring in pairs. A schizocarp is a dry fruit that develops from multiple carpels. When mature it splits into mericarps.

[14]Tyrtamus, a native of Eresus in Lesbos, was born c. 372 B.C. It is said that the name "Theophrastus," was given to him by Aristotle, his predecessor in the Peripatetic school, to indicate the grace of his conversation. His interests were wide-ranging, extending from biology and physics to ethics and metaphysics. His two surviving botanical works, Enquiry into Plants and On the Causes of Plants, were an important influence on medieval science. He died in 287 B.C.

[15]An emmenagogue stimulates or promotes menstruation and clears the congestion of blood. Pedanius Dioscorides (circa 40 to 90 A.D.) was a botanist, pharmacologist and physician from Anazarbus, a small town near Tarsus in what is now south central Turkey. He wrote *De Materia Medica*, which served as the standard catalog of botanical drugs for 15 centuries.

[16]An aperient is a laxative. A depurative is a substance used to decontaminate or purify. A diuretic is a drug that promotes urination.

[17]An antiscorbutic is effective in the prevention or relief of scurvy.

[18]In spite of its many buckthorn common names, *Rhamnus frangula* does not have any thorns.

[19]The Scandinavian peninsula is a geographic region which extends to the north of the Arctic Circle, and comprises Norway, Sweden and part of northern Finland.

[20]It was probably introduced to North America before 1800, but did not become widespread and naturalized until the early 1900s.

[21]A calcareous soil is one which is mostly or partly composed of calcium carbonate; i.e., it is chalky or contains lime.

[22]In some areas, it is reported to spread aggressively in wet, forested locations.

[23]Hermaphrodite flowers have both male and female organs. Entomophilous means pollinated by insects. Protandrous refers to a flower in which the anthers release their pollen before the stigma of the same flower is receptive. This is a common method of avoiding self-fertilization.

[24]An infusion made from the dried, ripe berries is used occasionally; it is aperient without being irritating.

The Density of Honey

Moisture Content Affects The Volume Of A Pound Of Honey

Jim Thompson

Having been a honey judge for almost 40 years, I keep thinking of ways that a beekeeper can improve their entries in a show or their honey products for sale. Last year, I upgraded my refractometer to a digital model and came up with a theory that if a jar of honey was filled to the proper level, one could weigh the jar, look at a chart and determine the density of the honey. So I proceeded to collect data to make the chart.

Most beekeepers know that five gallons of honey weighs sixty pounds. Many years ago when the government bought honey it had to be in a square tinned five gallon container which was called a "Sixty." One problem with the sixties was the chemical reaction that honey had with the tin when it was used for a few months. Today, five gallon plastic containers have replaced the sixties and those who use them for honey may have noticed that when the containers are filled to the five gallon mark they may have different weights. And, if the containers are filled so they weigh 60 pounds, the level of fill is different. Obviously, these differences in weight mean that the honey has different densities.

On a smaller scale, it has been said that a gallon of honey weighs 12 pounds. Again that information comes from the simple division of 60 pounds by five. However that 12 pound figure needs to be modified to having limits which accounts for its moisture content and temperature. Those limits are: 11.6343 pounds to 12.057138 pounds or approximately three quarts 15 fluid ounces to one gallon 0.9 fluid ounces. This presents a problem for most beekeepers who would like to know the density of the honey. Where do you get scales or volume containers that have that kind of accuracy?

I feel that the one pound honey jars would be the ideal size for the beekeeper to use. The plastic containers that are available were not considered because they present judging problems when placed in a polariscope. We want to find honey that is between 16.0% and 18.6% moisture and once that has been determined one may use any container for honey sales as long as it is made of food grade materials. When selling your honey, be sure that it is labeled properly.

Guidelines I used for this project:

- Know how much an empty jar weighs.
- Know the weight of the jar when it's filled with water.
- Know its weight when filled with corn syrup.
- The jar should be filled to the proper level.
- The jars should be weighed without the lids.

At a large honey show, when I had taken about sixty readings, a sample jar was rechecked. It was found that

Weighing an empty jar.

the entry of three jars, all filled to the same level, had one jar that was 0.4 ounces heavier than the other two. The heavy jar had come out of mold #7. Therefore there can be a great variation in weight of the glass containers. This fact destroyed my idea of making charts, but I continued to collect data. Later, I weighed two sample Queenline jars and two Classic jars at home. The Queenline jars weighed 8.0 ounces and 8.2 ounces while the Classic jars both weighed 7.8 ounces.

We know that an equal volume of water weighs less than honey. A gallon of water weighs about eight pounds. Water in the one pound Queenline honey jars filled with water showed weights of 1 lb. 3.0 ounces and 1 lb. 3.2 ounces. This means that the water in the jar was 11.0 ounces. (This is both weight and fluid ounces.) Using my metal bodied Atago "flip top" refractometer the display was totally black. The digital refractometer displayed the message "Sample out of range." I compared the volumes of water in the Queenline jar to the volume of water in the Classic jar and found them to be equal.

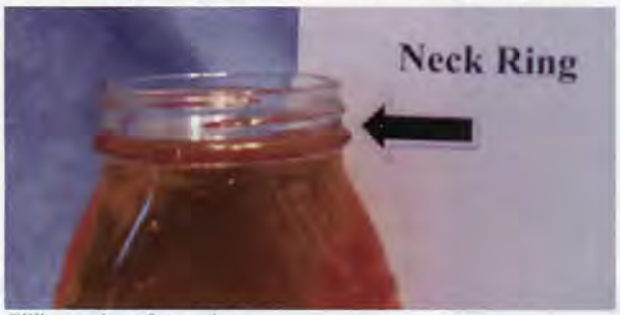
Testing water sample.

I checked the jars when filled with corn syrup to see if there was any difference in weight. Also, to see if there might be another way to check for "contaminates." With the flip top refractometer I have noticed an orange cast when checking calibration fluid, corn syrup, and mixtures of corn syrup. Last year in shows that I judged the dark honey grades were casting the orange color, so my test for contaminates should apply to the light amber and lighter grades of honey. When I compared the readings of the two refractometers, Atago & Misco, they were never more than .2 of a percent apart. The newer digital refractometer is

nice because you can show the results to anyone that is interested and it doesn't require any gyrations to get the right angle or focus. However you don't have any color indicators with a digital refractometer.

Filling the Classic jars with corn syrup revealed that there was 15.0 ounces of weight in the Queenline jars showing weights 1 lb. 7.0 ounces and 1 lb. 7.2 ounces respectively. This shows that corn syrup is heavier than water. After weighing some honey jars, it will be determined that corn syrup is lighter than an equal amount of honey. Therefore if the weight of a sample appears to be one ounce or more less than the expected weight, there could be high moisture or possible use of corn syrup.

The correct filling point of a jar is to the middle of the neck ring of the container. Overfilling may create a



Filling point of your jar.

messy problem for those opening the jar and under filling a jar would cheat a potential customer as it may not have the required volume. The reason the jar is filled to the middle of the neck ring is to allow for expansion and contraction due to temperature. The difference in weight of a jar for a jar that is filled to the bottom of the neck ring and the top of the neck ring seems to be 0.1 to 0.2 ounces in weight. Commercial packers of honey have fillers that can be set to fill certain amounts of weight to fill their containers.

Jars are checked without lids due to the variety of lids and this allows you to check the fill level from another angle.

Weighing a full jar.

Refractometer reading of honey sample.

The data from the honey shows reveal 16.0% honey in a Classic jar filled to the center of the neck ring weighed 1 lb. 8.0 ounces. The 18.5% honey weighed 1 lb. 8.0 ounces. The total range of weights from the data collected varied between 1 lb. 7.8 ounces and 1 lb. 8.4 ounces. With the exception of one sample jar that was 1 lb. 7.2 ounces, which would lead one to start thinking adulteration, contamination or high moisture. Queenline jars are not used as much as the Classic jars in honey shows, but it looks like the acceptable range should also be between 1 lb 7.8 ounces and 1 lb. 8.4 ounces also.

Honey that was checked by the refractometer showed a moisture of 16.5% weighed 1 lb 8.0 ounces in an 8.0 ounce jar.

The conclusion is that a jar of honey filled to the center of the neck ring and weighed without the lid should weigh one pound plus the weight of the empty jar to be within the acceptable density requirements (16.0 to 18.6%). This measurement seems to be consistent with the division of the limits of a gallon of honey which would be 15.52 ounces to 1 lb. 0.8 ounces without the weight of a container.

The formula for volume measure is to multiply 1.42 by the number of fluid ounces of a container to get the weight of honey. This means eleven fluid ounces of honey should weigh 15.62 ounces. It is interesting to see that this calculation also falls into the guidelines. BC

Jim Thompson is a seasoned honey judge, and collector of ancient beekeeping memorabilia. He lives in Smithville, Ohio.

The Flying Carpet

Let's take a trip around the world and see what other beekeepers do.

Ann Harman

Come join me on my flying carpet to visit other lands and discover beekeeping practices that could benefit beekeepers . . . or not. Wipe your feet before climbing on, please.

Our first stop will be in an Eastern European country. A beekeeper in a rural area wished to see me and discuss beekeeping practices. "Hello! Welcome to my home!' He grabbed my hand in both of his and shook it heartedly. I noted the usual layer of grime on his hands but in rural areas water is obtained by hand-pumping a shallow well. Little water is wasted. Handwashing, except briefly before eating, is not a priority. We sat and chatted about bees and finally discussed the big problem – *Varroa*. He proudly announced that he had obtained a wonderful new medicine to kill *Varroa*. In these countries the people love medicines. I expressed an interest so he jumped to his feet to retrieve the container and cheerfully handed it to me while explaining how it is used.

"There is a little measuring scoop inside the container and you mix one scoop of the powder with water and spray it on your bees." I can read Russian. The label says "coumaphos." I felt a sudden urge to scrub my hands thoroughly. I sincerely hoped that a layer of grime covered his last application of coumaphos.

Yes, I did suggest that he be very, very careful handling the material and that washing his hands afterwards was important. I emphasized that coumaphos was a very strong "medicine" and should be handled carefully. I did get a chance to wash my hands before eating but I wished for more water than the trickle from the water dispenser.

Let's climb back on the flying carpet (my hands are well-scrubbed now). When I arrive in a country to do beekeeping work I always pay attention to the trees and flowers that I see. I ask about ones that are unfamiliar – when do they bloom, do bees use them for pollen and/or nectar? The plants are good indicators of climate. Cold, hot, warm, dry, wet? Using real plants as climate indicators is much better than looking at charts of average temperatures or rainfall. What are the agricultural crops near the apiaries? Vegetables, grains, fruits? Crops give clues to available forage for bees.

Hold on tight because we're landing. Oh look at the size of the fig trees – as tall as a house and loaded with ripe figs. What a treat! It is entirely too cold on my hilltop in Virginia, and anywhere near, for me to grow figs. I have too many nights below freezing as well as many days, too, during the Winter months. Snow and ice are common. Figs are for warmer climates than mine.

So let us see what this beekeeper is doing. He has about 20 hives and they seem to be doing rather well. He wishes to show me his wintering house because he feels it might not be suitable. I ask why he puts his bees into a sealed-up shed for the Winter. "Because it's cold." I point to the fig tree and explain that it needs a warm climate to grow and produce figs. He insists that their Winter is cold.

The problem here is that the houses in rural areas are not well-heated so that outside temperatures in the 40s and 50s lead to houses in the 40s and 50s. If the people are cold, then the bees must be cold. But I have not discovered the real problem with the bee shed.

We walk over to it, on one side of the back garden. The shed sits next to a small rural road. He is worried that the bees do not get enough sleep since noise of the traffic on the road keeps the bees awake. I make the offhand remark that traffic noise would not bother the bees since they could not hear it. He looked puzzled and asks why can't they hear it? I told him the bees did not have ears like we have.

I did not expect the reaction from my statement. He was shocked. "No ears?" "They don't have ears?" He was completely shattered. I ruined his day.

We returned to the house and had some tea and fresh figs. He kept muttering and shaking his head. "No ears." "Those poor bees." "No ears." It was obviously time to leave.

Since a magic flying carpet does respond to directions I request a country with something useful to bring back to our beekeepers here. So we land in a nice small apiary with hives in two rows, well spaced. I am always telling beekeepers to supply water for their bees unless a pond or stream is nearby. Now here we can see a very clever water supply that would fit the needs of a small apiary here in the U.S.

You have certainly seen the chick or quail waterers made of a gallon jug, screwed into a cap with trough and turned upside down. You can certainly use these but bees always drown in the little trough. But not the bees in this apiary! The trough has a plastic float, donut-shaped to fit. The float has holes cast into it so that the bees can sit on the float and dip their tongues through the holes into the water. Such a float is cheaply made, easy to clean and easy to use. What a clever idea. Perhaps we will find something else useful on our journey.

I am certain you realize that beekeepers enjoy making equipment and gadgets to make beekeeping tasks easier. However, we rarely tackle something as large as an extractor. The carpet has landed us at the home of an ambitious beekeeper who wishes to show us every piece of beekeeping equipment he had made.

I had guessed, in my travels around Russia and the ex-Soviet countries, that somewhere there had

to be a large manufacturing plant that made blue paint, a particular shade of blue. It has to have been made in tank-car quantities for it appeared on the window and door trim of every house and just about anything else that was painted. The blue pigment must be cheap but I can only guess what it is. A compound probably not overly poisonous but certainly not edible.

The shed in back of the beekeeper's house held some empty hives, painted blue of course. And there, off to one side, stood a fairly large extractor, holding about 12 to 15 frames. The beekeeper was very proud of this extractor for he made it himself. I admired it and told him it was a fine extractor. However I made a mental note not to eat any of his honey. The extractor was heavily painted outside and *inside* with – you guessed it – the ubiquitous blue paint.

As we float along perhaps we'll find a beekeeper in need of some help. Beekeepers around the world have an assortment of problems. Some can be fixed easily, others perhaps not for years. Our carpet has guided us to a beekeeper with a simple problem. Good. We can solve this one and be on our way quickly.

Large wasps are indeed a problem in a number of countries. Wasp larvae need protein food, just like honey bee larvae. But instead of the bee's nutritious worker jelly and pollen, wasps prefer other insects and insect larvae. A beehive with its abundant brood is a five-star takeout restaurant for wasps in search of food for their hungry larvae.

This beekeeper has purchased a nicely-made wasp trap. It is quite fancy and probably cost quite a bit of money. However the beekeeper is totally unhappy with it. The trap seems to be filled with a horrible-looking semi-liquid, dark sludge made mostly of quite dead honey bees and, at this point, an unidentifiable liquid. The trap sits atop a bee hive in the middle of the crowded apiary.

What sort of bait did you use for your trap? "Honey," the beekeeper answers. Why honey? Well, it seems he thinks that is what the wasp steals from the beehive. Why is it in the middle of the apiary? Because there is where he finds the wasps.

Well, this problem is easily straightened out although the explanations of how he created a worse problem took much longer than expected. In case you are wondering, bait the trap with some bits of meat; discover the flight path of the wasps; hang trap away from the apiary along the flight path.

It's getting late. We have time for one more stop. Wipe your feet! A gritty flying carpet is as bad as cracker crumbs in bed.

We do need to find something else useful. So back onto the carpet we go. Look down! Let's land. Here is an apiary of about 50 hives and in the middle stands a truly useful water source for bees. This water source would be perfect for small apiaries, outyards, especially those visited infrequently, large apiaries, beeyards in arid climates and anywhere else you can think of.

The materials to make this water source are cheap and simple. You need a three- or five-gallon white plastic bucket with lid, a brick or rock to put on top of the lid, an old leaky faucet or IV drip line with adjustment, and some pieces of wood.

This water source stays clean, is completely safe for the bees and can be put anywhere convenient for you to refill with water. It does not require bits of straw, pieces of twigs, chips of wood or anything else that tends to get slimy and has to be cleaned.

First construct a stand for the bucket out of some pieces of wood; any old scrap stuff will do. The bucket needs to sit about three feet high. The exact height is not important. You do want to be able to fill the bucket easily with water. Now you need a board, not treated wood, that sits on a slant from the bottom of the bucket to the ground. An old fence board works well. If you don't have one ask a neighboring farmer. If you are handy with tools you can cut a shallow zig-zag groove down the length of the board. The groove is not essential but it is fun to see your bees lined up along it and sipping the water.

If you have an old leaky faucet that can still be adjusted, make a hole on the side of the bucket near the bottom and install the faucet, using some silicone caulk. If you have an IV drop line you will need only a small hole but seal around the tubing with caulk. You will have to cut the IV line so that the tubing reaches the top part of the slanted board.

Put the bucket on the stand; fill bucket with water; and put lid on top but do not make a tight seal. The top keeps leaves and other debris from falling in. Put brick or rock on lid to keep it in place.

Now adjust leaky faucet or IV drip line so that water drips on the slanted board. Adjust so that the bottom few inches of the board are dry. Your bees will be very pleased, and so will you.

Let's head for home! We can take another trip sometime. I'll roll up the carpet and stuff it in a closet. Hope you enjoyed your trip. BC

Ann Harman flies all over the world teaching and helping beekeepers.

THE NATIONAL

Bob Maurer

October 28-30, 2010 – London

International tennis players long to have a Wimbledon title to their names. For beekeepers, Britain's National Honey Show has the same appeal. The show benches are packed with the very best examples of our craft and a walk around them is an instant education. Want to know what chunk honey should look like? Want to see how perfect a block of wax can be? This is the place. Competition is tough. Entries come mainly from UK but many classes are open to the world and believe me, the world's best ship in their honey and wax. Anyone who wins an open class can be sure that their work is of the very highest standard.

The National Honey Show has its deepest roots in the 19th century. In 1874 Thomas Cowan and Charles Abbot founded the British Beekeepers Association and in the same year, Abbot (who clearly had a lot of spare time on his hands) was a key person in the development of a honey show at the 'Crystal Palace' in London. Honey shows became regular events there. The Crystal Palace was an amazing building made from cast iron and glass, more than a third of a mile long, over 100 feet high and had a footprint of almost 100,000 square feet. It was originally built in London's Hyde Park to house the Great Exhibition of 1851. This was one of the first World Fairs, promoting culture and industry. After the exhibition, the whole building was dismantled and moved to a site in south London where it remained until 1936 when it was destroyed by fire.

The National Honey Show we know today began in 1923 when two county beekeeping associations who had held some joint shows at Crystal Palace decided to make the show a national event. Unfortunately the 1936 fire destroyed all the show equipment. The organisers had to start from scratch as someone forgot to check the insurance policy and there was no cover! As the show grew, more space was required and in recent times it has moved to a variety of locations in and around London.

If you would like to read more about the National Honey Show and its history have a look at the website www.honeyshow.co.uk How about coming over to visit? Why not bring some exhibits? It can be a bit of a handful getting honey exhibits through customs but it's not impossible. The show schedule will soon be available on the website and to give you an immediate idea of the classes, the schedule from 2009 is still available. See you there! BC

GLEANINGS

AUGUST, 2010 • ALL THE NEWS THAT FITS

PHILADELPHIA BEEKEEPERS DEDICATE LANGSTROTH PLAQUE

The Philadelphia Beekeepers Guild is proud to announce its partnership with Bartram's Garden, the Wagner Free Institute of Science and Wyck Historic House to offer Philadelphia's 2010 Honey Festival on the weekend of September 10-12.

Beekeepers across the U.S. and the rest of the world celebrate the 200th birthday of Philadelphian Lorenzo L. Langstroth, "The Father of Modern Beekeeping," born at 106 South Front Street on December 25, 1810. Philadelphia's 2010 Honey Festival will begin by commemorating the life and work of Rev. Langstroth (LLL) for his invention, the removable frame hive, with the placement of an historic marker on Front Street by the PA Historical and Museum Commission, on Friday September 10 at 3:30 pm.

Marc Hoffman will perform "The Bee Man," a one-man play about LLL's life and discoveries about the honey bee, at several venues. The Philadelphia Beekeepers Guild will screen "Bee-Movies" at the Circle of Hope Church in center city. The DaVinci Art Alliance will hold an art exhibition, What's the Buzz, at Bartram's Garden. As the full slate of activities develops, it may be found at **phillyhoneyfest.com**

Opportunities exist for sponsors, vendors and volunteers. Please contact Suzanne Matlock at info2010@phillyhoneyfest.com

OBITUARY

Havilah "Huck" Babcock, Jr. died April 4, 2010. A graveside service was held April 8 in Babcock Cemetery in Appomattox, Virginia. Huck was 90 years old.

He was born March 29, 1920 in Appomattox, the son of Dr. Havilah and Alice Hudson Cheatham Babcock. He was a graduate of the University of SC, Class of 1941.

He was preceded in death by his wife Coralee Gilliam Babcock. Huck is survived by his daughter, Barbara Weston and her husband William Weston and grandchildren, William (Claire) Weston, Havilah (Robin) Weston, Eliza Weston, all of Columbia and great-grandchildren, Beatrice Grace Weston and William Ray Weston IV.

Huck Babcock was the propriator of Blue Ridge Apiaries, producing queens and packing honey, located in Cayce-Columbia, SC.

THE NATIONAL HONEY SHOW PROGRAM

NHS Workshops 2010

All workshops are scheduled for 2½ hours

Thursday 28th October 2.30 PM

1	Wax Modelling £5	Martin Buckle
2	Preparing honey for the show bench	Peter Schollick
3	Microscopy course: pollen identfication £5	Alan Kime

Friday 29th October 10.00 AM

4	Make your own wax flowers £5	Liz Duffin
5	The Beekeeping Ladder: from Hobbyist to Commercial or Semi-Commercial Beekeeper	A Bee Farmer
6	Honey Judging Technique	Peter Matthews and Enid Brown
7	BBKA Module-Basic Exam	Tom Salter

Friday 2.30 PM

8	What to do with your spare wax	Kathy Summers
9	The use of Apideas for all	Terry Clare
10	BBKA Module 2	Margaret Thomas
11	Taking Better BEE Pictures	Claire Waring

Saturday 30th October 10.00AM

12a	Make your own Skep Part 1 £10	Martin Buckle
13	What to do with your spare wax	Kathy Summers
14	Make your own wax flowers £5	Liz Duffin
15	BBKA Module-Exam Technique	Val Francis

Saturday 1.30PM

16	Preparing honey for the show bench	Peter Schollick
12b	Make your own Skep (continued) Part 2	Martin Buckle
17	The use of Apideas for all	Terry Clare
18	BBKA Module 1 Introduction to Beekeeping	John Hendrie
19	Make your own toiletries £5	Dr Sara Robb

All workshops are scheduled for 2½ hours duration.

Unless otherwise stated, all workshops are free to NHS members or those with a valid Day Ticket. Additional charges for materials (shown above) will be collected at the session. Anyone wishing to attend a workshop should register as soon as possible and no later than Saturday 23rd October 2010 by contacting Peter Matthews either by email: silverhive@btinternet.com or telephone: 01461 205525

All participants who have reserved a space MUST confirm their presence a minimum of 15 minutes before the start of the workshop as failure to do so will result in the space being reallocated.

Programme and Provisional Lecture Convention:

THURSDAY 28TH OCTOBER 2010

1:45 Doors open
2:00 Opening Ceremony Martin Smith, President BBKA
2:30 Workshops
2:30 Kim Flottum (US) The Coming of Age of Varietal and Artisan Honey
4:30 Dr Mark Goodwin (NZ) Beekeeping in New Zealand and the Manuka Story
5:00 National Honey Show AGM & Annual Meeting of the National Council.
6:00 Show closes

FRIDAY 29TH OCTOBER 2010

9:30 Hans-Ulrich Thomas (Switzerland) How Bee Swarms Choose a New Home
10:00 Workshops
11:30 Kim Flottum L L Langstroth 200 years on
2:30 Workshops
2:00 Dr Mark Goodwin Paid Pollination Services
4.00 Jim Ryan Managing a colony to get the best from your bees - a seasonal perspective
6:00 Show closes

SATURDAY 30th OCTOBER 2010

9:30 The Jean Blaxland Memorial Lecture
Dr Mark Goodwin Controlling AFB without Drugs
10:00 Workshops
11:30 Hans-Ulrich Thomas Bees and Beekeeping in Switzerland
1:00 Nigel Raine Learning to Forage in the Floral Supermarket
1:30 Workshops
3.00 Kim Flottum Urban beekeeping - the Backyard beekeeper
3:45 Presentation of Trophies and Awards
4:30 Show closes

Thanks to Lecture Sponsors:
The Central Association of Beekeepers, The Bee Farmers Association, Maisemore Apiaries, Park Beekeeping Supplies, Omlet, BDI, Thornes, BeeCraft, BBKA, and Northern Bee Books

If you are unable to deliver in person, show entries can be sent by post, delivered via Northern Bee Books, or any (English) branch of Thornes.

Entries must be made on the form provided in the Show Schedule or online and reach the Entries Secretary by the ***1st October 2010.***
Late entries (except classes 54-62, inclusive i.e. essays, videos, transparencies and photographs) may be made until 24th October, but will incur an additional single late entry fee of £5.00
For online entries please pay at Show.

CALIFORNIA TRAINING

The California State Assembly votes 61-15 to establish the California Apiary Research Commission to identify and educate beekeepers on integrated pest management practices and to improve bee colony management practices.

"We cannot have a prosperous future for California agriculture without honey bees," says assembly member Noreen Evans (D-Santa Rosa), who introduced the legislation.

"We need this commission to preserve the availability of healthy and nutritious food. Nearly a third of the fruit and vegetables that we eat are derived from insect-pollinated plants."

The legislation now goes to the State Senate for further review.

Under the legislation, the seven-member commission will be funded through fees assessed on bee colonies, not to exceed $1, which must be approved by a referendum among the beekeepers equal to 65% of California's bee colonies.

The Assembly Committee on Appropriations says the commission will cost about $500,000 a year.

There are about two million colonies operating in California and an assembly briefing paper says the maximum assessment revenue would be about $2 million a year.

"The actual assessment rate would likely be some fraction of that," the paper says. "Most likely the program would be similar to other mid-range research programs within CDFA (California Department of Food and Agriculture) and would cost about $500,000 a year."

Honey bees pollinate about $6 billion worth of crops in California.

"The sponsor believes there is a need for organized research to protect the health of honey bees to avoid an imbalance for our agricultural food supply," the briefing paper says. – *Alan Harman*

BEES NEED TO REST

Bees observe a strict working day, even when there are days of 24-hour sunlight.

British researchers Ralph Stelzer and Lars Chittka of Queen Mary University in London tagged worker bumblebees with a radio identifier, similar to an Oyster Card, which was used to monitor their movements during the constant light of the Arctic Summer at a research station in Northern Finland.

"Constant daylight would seem to provide a unique opportunity for bumblebee foragers to maximize intake, and therefore colony growth, by remaining active during the entire 24-hour period," Stelzer says. "We found bees do not naturally take advantage of this opportunity, suggesting there is some benefit to an 'overnight' break."

The researchers report in the open access journal BMC Biology they studied both native bees and a group of bee colonies they imported into the Arctic.

Both species worked a day shift, with maximum activity around midday, and retired to their nests well before midnight.

Stelzer and Chittka speculate the bees must have some way of telling the time in the absence of day/night cues, suggesting the insects may be sensitive to light intensity and quality or changes in temperature.

They say there are possible advantages gained by taking some time off.

"Despite the light, temperatures do fall during the Arctic 'night', so it may be the bees need to return to their nests to warm their brood," they say. "Also, it has been suggested that a period of sleep helps bees to remember information gained during the day's foraging"

– *Alan Harman*

UK RESEARCH

British neuroscientists begin research seeking to learn if a cocktail of chemicals from pesticides could be damaging the brains of British bees.

The theory is that by affecting the way bees' brains work, the pesticides might be affecting their ability to find food or communicate with others in their colonies.

Researchers from the University of Dundee have been awarded £1.8 million to examine whether the use of pesticides is hampering the cognitive functions of bees - and possibly hastening their demise.

The multidisciplinary project, led by Chris Connolly and Jenni Harvey from the University's Centre for Neuroscience, will examine whether chronic exposure to a combination of chemicals could be harming bumblebees and honeybees, whose decline in number has attracted worldwide coverage over the past few years.

It is one of nine projects to share in a £10-million funding package announced as part of National Insect Week. The funding is provided by the Insect Pollinators Initiative, which aims to explore the causes and consequences of threats to insect pollinators, ensure that the pollination of agricultural and horticultural crops is protected and that biodiversity in natural ecosystems is maintained.

The Dundee team will investigate the 'synergistic impact of sublethal exposure to industrial chemicals on the learning capacity and performance of bee's brains'. While pesticides are screened to be non-lethal to bees before they are passed for use, Connolly says the Dundee team will examine whether a combination of chemicals used in agriculture may cause unexpected damage to bees.

The researchers will monitor honeybees and bumblebees and investigate their ability to learn different visual and olfactory tasks. In addition, they will assess their performance using the radio tagging of individual bees. Finally, the group will attempt to develop the first honeybee cell line for use in the screening of future pesticides and miticides.

Some of the projects funded under the initiative are:

•Sustainable pollination services for UK crops - Koos Biesmeijer, University of Leeds.

•Modeling systems for managing bee disease: the epidemiology of European Foulbrood - Giles Budge, Food & Environment Research Agency.

•Investigating the impact of habitat structure on queen and worker bumblebees in the field - Claire Carvell, NERC Centre for Ecology and Hydrology.

•An investigation into the synergistic impact of sublethal exposure to industrial chemicals on the learning capacity and performance of bees – Chris Connolly, University of Dundee.

•Linking agriculture and land use change to pollinator populations - Bill Kunin, University of Leeds.

•Urban pollinators: their ecology and conservation - Jane Memmott, University of Bristol.

•Impact and mitigation of emergent diseases on major UK insect pollinators - Robert Paxton, Queen's University of Belfast.

•Unraveling the impact of the mite *Varroa destructor* on the interaction between the honey bee and its viruses - Eugene Ryabov, University of Warwick.

•Can bees meet their nutritional needs in the current UK landscape? - Geraldine Wright, Newcastle University.

– *Alan Harman*

BARGE OVER TROUBLED WATER

The first shipment of bees to Vancouver Island off British Columbia after a 22-year embargo was something less than successful.

Now B.C. Ferries and a Vancouver Island beekeeper are blaming each other for the escape of honey bees from a transport truck on board the ferry Spirit of British Columbia.

Thousands of bees flew out of net-covered hives and covered the car deck. There are reports the ferry crew used fire hoses to clear the bees from the deck.

Babe's Honey owner Mark Pitcher tells the Victoria Times-Colonist newspaper he met with B.C. Ferries staff prior to the voyage to ensure the bees, the ferry passengers and crew would be safe.

He wanted the truck loaded first and put up front, the ferry's rear doors opened to allow air flow and the lights on the main car deck shut off, leaving only emergency lighting on.

"We'd written all the protocols," he says. "We'd talked to everybody all the way up to it and they didn't do a single thing they were supposed to do, including all the directions of the provincial apiarist for the province of B.C."

Pitcher estimates only 600 bees escaped the shipment and none, he said, posed a risk to crew or passengers.

B.C. Ferries says the onus for securing the bees being transported in their hives falls on the owner of the hives.

"I don't see how the heck this is supposed to be our fault – his bees are supposed to be contained," a spokesman says.

"We want to support the industry on Vancouver Island. We don't want to cause them any hardship, but if it's putting passengers and crew in a potentially dangerous situation we're going to have to look at whether we continue to transport them or not."

Pitcher is no longer relying on B.C. Ferries. For his second load, 400 hives containing 3.5 billion bees, he hired a barge to take them to Vancouver Island.

– *Alan Harman*

7 FAIRMONT HOTELS HOME TO HONEY BEES

The Fairmont Hotel atop Nob Hill in **San Francisco** installs four beehives in its new culinary garden on the hotel's lobby level.

The installation is the first step in cultivating a culinary garden that will measure 1,000 square feet. He plans to add rosemary, thyme, oregano, basil, chives and cilantro to the lavender now growing in the garden. Guests can view the culinary garden through floor to ceiling windows in the hotel foyer.

"The cultivation of beehives marks the latest step in The Fairmont's history of environmental stewardship," says hotel general manager Tom Klein.

This year the beehives are expected to produce about 250 pounds of honey to be served to hotel guests as part of The Fairmont's commitment to offering local, organic, sustainable cuisine. The honey will be used in soups, salad dressings, pastries, ice cream and as an accompaniment to the hotel's time-honored afternoon tea service.

The hives in San Francisco come from Spencer and Helene Marshall of Marshall's Farm in American Canyon, Calif., who have been producing award-winning organic honey since 1993. They operate beehives throughout Northern California and their honey is served at The Culinary Institute of America.

The Fairmont Waterfront in **Vancouver** shares its 2,100-square-foot herb garden with six beehives on the hotel's third-floor terrace. The hotel's inaugural honey bee season in 2008 produced a harvest from two hives, while in 2009 the hotel hatched their own queen bee for a third hive and captured a fourth hive of wild bees that outgrew their original home in nearby Stanley Park.

This year there are two additional hives producing an anticipated 500 lbs of honey.

The Fairmont Royal York in **Toronto** expanded its own rooftop apiary from three to six hives in summer 2009. Since June 2008 nearly 800 pounds of honey have been harvested from the 14th story apiary.

The Fairmont **Washington, DC** welcomed Italian honey bees in summer 2009 to their three new hives on the roof. The bees enhance the hotel's culinary program along with its interior courtyard garden, which provide fresh herbs and flowers such as edible pansies, as well as plants, trees and flowers.

Fairmont **Mount Kenya Safari Club** has partnered with local beekeeper Stephen Macharia, who has been in the beekeeping business for over 17 years, to bring fresh honey to guests. He started out collecting wild honey from the slopes of Mount Kenya and now has eight hives on the hotel property. Each beehive will produce an average 66 lbs of high quality honey with the resort expecting its first harvest by September.

At Fairmont Le Chateau Frontenac in **Quebec**, four Queen Bees made their debut in four hives in the Chef's roof top garden last year. Each hive will produce enough honey for the entire hotel, with the extra being sold in the Fairmont Store. The honey is harvested three times a year.

The Fairmont Algonquin in St. Andrews by-the-Sea, **New Brunswick** has welcomed royalty spanning two centuries, but in 2008 welcomed a queen of a different kind. That's when their own queen bee took up residence in the hotel's lavish gardens. The honey is on sale for guests and is also used at the hotel's three restaurants.

– Alan Harman

HEALTHY BEES

Honey bees could help in the fight against hospital superbug MRSA.

Researchers says beeglue, or propolis, which bees make out of material from trees and plants in the Pacific region, was found to stop the bacteria from growing.

Two compounds, Propolin C and Propolin D, were isolated during tests on 15 strains of MRSA.

Both compounds stopped MRSA growing but the researchers said more tests are needed to establish if the extracts can actually kill the bacteria.

Researchers from the University of Strathclyde in Glasgow, working with Natures Laboratory in North Yorkshire, say the discovery may lead to new anti-MRSA medicine.

The results of the study were published in the Phytotherapy Research journal. The university says the research is the first to describe the anti-MRSA properties of Propolin C and Propolin D.

Study leader Veronique Seidel, a lecturer in natural products chemistry at Strathclyde, says one of the few available drugs to treat MRSA infections is an antibiotic called vancomycin.

But new strains have been emerging which show limited susceptibility, or even resistance, to vancomycin.

"This means there is a pressing need to discover and develop alternatives to current anti-MRSA drugs," he says.

"We investigated propolis, as part of a program aimed at discovering new antibiotics from natural sources, because bees use it as an antiseptic glue to seal gaps between honeycombs and preserve their hives from microbial contamination," Seidel says.

"Beeglue is also a natural remedy widely used in folk medicine for a variety of ailments but little has been known until now about its capacity to target MRSA.

"Our results have been highly encouraging and we will be taking our research further to understand how active substances in propolis work and to seek the treatments which patients urgently require."

Dutch scientists have discovered a protein in honey that can kill bacteria.

The researchers at the Department of Medical Microbiology at the Academic Medical Center in Amsterdam Bees say the protein with antibacterial properties could form the basis for new drugs that could one day be used to treat burns and skin infections and to develop new drugs that could combat antibiotic-resistant infections.

The discovery also could lead to the breeding of bees with stronger immune systems that produce more potent antibacterial proteins

The research published in the FASEB Journal shows bees make a protein that they add to the honey, called defensin-1.

"We have completely elucidated the molecular basis of the antibacterial activity of a single medical-grade honey, which contributes to the applicability of honey in medicine," researcher Sebastian A.J. Zaat says.

"Honey or isolated honey-derived components might be of great value for prevention and treatment of infections caused by antibiotic-resistant bacteria."

Zaat and colleagues made the discovery after they investigated the antibacterial activity of medical-grade honey in test tubes against a panel of antibiotic-resistant, disease-causing bacteria.

They developed a method to selectively neutralize the known antibacterial factors in honey and determine their individual antibacterial contributions.

Ultimately, they isolated the defensin-1 protein, which is part of the honey bee immune system and is added by bees to honey. After analysis, the scientists found the vast majority of honey's antibacterial properties come from that protein. This information also sheds light on the inner workings of honey bee immune systems, which may one day help breeders create healthier and heartier honey bees.

"We've known for millennia that honey can be good for what ails us, but we haven't known how it works," FASEB Journal editor Gerald Weissmann says. "Now that we've extracted a potent antibacterial ingredient from honey, we can make it still more effective and take the sting out of bacterial infections."

– Alan Harman

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Ed Colby

Life Is A Gift

This morning on my way to Garfield Creek with a load of pollen traps, I did a double take when I saw the hospital ambulance parked in front of Patti's Main Street Coffee House. The paramedics like to stop in for breakfast. One is a bilingual Latina with flashing dark eyes, and I hoped I might strike up a conversation while I filled my coffee thermos.

They were sitting by the coffee urn, where I'd hoped they'd be, but this time two men were wearing the uniform. I used my line anyway and cheerfully inquired, "How's business?"

"It's good, or it's not so good, depending on how you look at it," one of them said. "Without other people's misfortunes, I wouldn't have a job. But today so far it's quiet."

He looked vaguely familiar.

From behind the counter Patti asked what I was up to, and when I mentioned, "bees," the talkative paramedic stood up.

"You're the beekeeper who got buried in that avalanche on Aspen Mountain!" he exclaimed. "I drove you to the hospital! You were buried for nearly five minutes. You were blue when your ski patrol buddies dug you out! Irreversible brain damage starts at six minutes without oxygen! You were so lucky!"

"Maybe I did go too long without air," I said.

"This could explain a lot," Patti laughed.

Then the paramedic threw his arms around me and said, "It's good to see you again!"

Wow. In the five years since this most unforgettable incident, I'd never encountered anyone (other than myself) so impressed with my good fortune. And despite my initial embarrassment at his display of emotion, I really was touched.

Now Patti wanted to hear the whole story. I generally don't go blabbing it around, so gentle reader, I'll leave the details to your fertile imagination.

But I will tell you the lesson learned from a careless mistake, and it's an important one, so don't you ever forget it: Simply put, life is a gift.

My gentlewoman rancher first wife Cathy just bought 65 acres of Flathead Lake, Montana shoreline. She planted it in sweet clover for soil improvement.

I said, "Sixty-five acres of clover! You're going to make some beekeeper very happy!"

"Really?" she said. "I never thought of that."

I haven't always kept bees, so how would she know? I might obsess about them, but why should most people give bees a second thought?

When people say to me, "So how are the bees?" I always say, "The survivors are doing great!" Then I tell them way more than they really wanted to know.

Our western Colorado Winter was relentlessly cold, and the little darlings never got out of the hive for a couple of months, beginning in early December. When I checked the first week in February, there were some signs of dysentery, but all in all they looked pretty good. I'd lost two of 75. Then the weather got nice, and the weaker colonies dwindled, until by April I'd lost a third.

I was feeding pollen supplement in the spring, so I watched those hives die right before my eyes. Every week I'd lose a few. I'd shrug and tell myself the worst was over, but it was a long time before it was.

I took all of my bees to Grand Junction and Palisade for the orchard bloom, and they prospered there. Despite an extraordinary chalkbrood epidemic, by mid-April I had plenty of colonies to split.

I get most of my queens from a guy who purchases them by the hundreds if not thousands. He buys from a handful of producers. He knows the commercial beekeeper's secret handshake and always gets the inside word, so I get some pretty decent queens.

Still, introducing even good queens is never a slam dunk.

You hear this stuff about re-queening every year, but why would you do that? You could kill your best producer and replace her with a dud. It happens all the time. Sometimes a hive won't accept a new queen, or if they do, they supersede her right away. New queens can be poorly mated or even drone layers.

I mostly use new mated queens for splits and nucs.

This year I had some new queens that I couldn't use right away, so I banked them in a queenless nuc. That's the way you're supposed to do it. They were in plastic cages inserted into a plastic JZ-BZ shipping bar. I just squeezed the bar between two frames in the nuc.

Except the nuc turned out to have a queen, after all. Didn't matter. I held a dozen queens for three weeks, and only lost one.

The dumbest thing I ever did with queens was leave a box of them on the kitchen table when I left for a weekend in Santa Fe. I never even gave them water. When I got back, half were dead, and the rest didn't look so great. That's how we learn, however, or at least how I do.

Marla Spivak from the University of Minnesota spoke at the June Colorado bee meeting at Paul's place in Silt. She did a little queen grafting demonstration, and whenever somebody came up with a question she didn't know the answer to, or maybe hadn't thought about before, she'd say, "I'll get one of my grad students to do a project on that!"

It was old home week for Marla, who used to work for Paul. I like it that the beekeeping world really isn't so big.

I'm always a little wistful when the meeting breaks up, and we part from colleagues we likely won't see again until the Winter meeting. Because over time, we become more than just fellow beekeepers. We become friends.

Ahhhhh, life is a gift.