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Feb 2012

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Bee Culture

This month 1.5 million U.S. colonies will move from holding yards like this into 750,000 acres of almond orchards in California's San Joaquin Valley. Bee Culture will be there for the Grandest Pollination Event in the universe! Travel with us for the next few weeks on our Almond Odyssey from Bakersifled to Sacramento. See page 20 for details.

Photo by Gordon Wardell, Paramont Farms, Bakersfield, CA

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FEATURES . . .

DEPARTMENTS & COLUMNS

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Insurance Scam?

I have just been contacted by my insurance agent over the fact I keep bees in my backyard.

I have a suburban lot in Kirkwood Missouri (a suburb of St Louis) and I have two hives in my yard.

My agent apparently did an inspection of my house and saw the hives and decided this was a risk she could only cover by putting my home on a small farm policy, which is coincidentally three times the cost of my current insurance policy! She said she was concerned about the elevated risk of people suing because of stings and allergic reactions, but did say that my policy would also cover me for selling products that might later make someone ill! She claims she has contacted several insurance companies to see if any other companies have policies that might cover me for keeping bees. Apparently none do! My insurance is currently with American Family.

My initial reaction is that this is simply opportunistic. I was told by my agent that most people when confronted with this issue give up keeping bees on their property. So I can only assume that people who do keep bees in their yards do so either unaware, or in contravention of their insurance policies or they have never had their properties 'inspected' i.e. what the eye doesn't see the heart doesn't grieve for!

I am also irritated by the assumption that I am assumed to be the guilty party if someone gets stung. My agent said that if someone gets stung in my neighbourhood they may be able to sue me without proving the sting came from one of my bees. Because I keep bees I have an elevated profile and so I am assumed to be the party responsible. It seems strange that I would have to prove it wasn't one of my bees in order to avoid being sued. I think proving one way or the other would be extremely difficult. Anyway, I live in an area where there are several backyard beekeepers living within a small radius – perhaps 200 yards. This is an issue we will be discussing!

So, I wonder if you have any advice for me, or if you know of any beekeeper friendly insurance companies you could recommend?

Phil Ewing
Kirkwood, MO

Monsanto

As I sit here in front of my computer 3:30 in the morning, a few days before Christmas, my thoughts are not of the coming holiday. No, I woke this morning with thoughts of honey bees.

My journey into the realm of the honey bee began late 2009 with my family's desire to become more self-sustaining and to know where our food came from instead of the "factory" since my family was awakened to the fact that Monsanto, their mad scientists, the government lobbyists, and the "revolving door" with the FDA policies pertaining to the safety of the American food supply and how they control it from the seed to the supermarket.

How Monsanto and their hoards of attorneys, and an unlimited supply of money go out and sue family farmers for patent infringement because a neighboring crop cross pollinated with theirs and they shut down family farms that have been in operation for decades. My own uncle fought this monster for nearly seven years at the tune of 10 MILLION dollars ***JUST TO SAVE HIS OWN SEED.*** It is without a doubt another way to control the food supply for millions of people around the world. Control the food, control the people.

Now bees???? Monsanto creates the chemicals that commercial agri-farmers/corporations spray onto the crops that kill the bees. They created the GMO (Genetically Modified Organism) to grow bigger "better" foods that need their chemicals in order to be productive. They change the DNA of the particular plant in order for it to "accept" their chemicals and we put this crap into our bodies? Without it being looked over by the FDA? Wait, the revolving door policy with Monsanto and the FDA allows them to police themselves.

Based on their history, I am assuming that they are going to patent the honey bee, create some super genetically modified bee that is immune to the chemical crap that Monsanto produces and then the honey bee can magically create a honey "product" that will compete with the Chinese honey for the chemical laden crap they send in through India? Are you kidding me?

In the December 2011 *Bee Culture*, I quote . . .

"Several years ago, Nov 2008 pp 15-17 readers of *Bee Culture* first learned about RNAi and more particularly about Remebee © a product that shows promise in healing bees and their colonies avoid infection from viruses that may cause CCD."

It's one of the reasons why our announcement recently that Monsanto purchased Beeologics is coming at a good time. (I bet it was a healthy chunk of change.) While I recognize that some people may have concerns about Monsanto getting involved in bees, (really? You're kidding? I wonder why you would say this?) I can assure you that Monsanto's leadership team and scientists recognize the value of Beeologics research to the global bee community and are committed to continuing our work in advancing bee health. (12/2011 *Bee Culture* pp 7)

While I can appreciate the fact that we are all looking for the reasons our bees are dying, the farmers still spray the Monsanto sprays, the beekeepers lose 30-40% of their bees each year and have to absorb those losses, all of the costs of transportation, medication, (yes we have to medicate now thanks to the plethora of chemicals) while the farmer complains that he has to spend $200 per colony to pollinate when it cuts into the millions he will earn. And the brokers continue to take their cut. Come on.

When are the American people

(especially beekeepers) going to wake up to this monster and start asking questions?

Monsanto DOES NOT CARE about the bees. They only want to control EVERY ASPECT of the food supply chain. LOOK UP THEIR HISTORY and do the research for yourself.

Without bees there is no pollination, without pollination THERE IS NO FOOD to harvest!!!

It is all about control and creating some freak "superbee"

Mark my words, this will be no different than when Monsanto tried to take over the dairy industry in the mid-west, how soon we forget.

Don Aman
Yakima, WA

Muslims & GMO Pollen

Dear Editor,

Below a copy of our Muslim response to the EU Commissioner regarding contamination of honey with GM pollen.

THE MUSLIM RESPONSE

To Mr John Dalli
THE EU COMMISSIONER
DG Health and Consumer Policy
European Commission
Rue de la Loi 200
B-1049 Brussels,BELGIUM

Dear Mr Dalli,

We would like, on behalf of the 40 million European Muslims, to express our deep concern and unhappiness regarding the contamination of our holy BEES and HONEY with GM pollen. This was, no doubt, very worrying news to all of us: the European Muslims and the Muslims in the world (1600 million).

It is a big worry to all those farms and the producers of honey in Europe who are from different religions. This unexpected unnatural contamination is going to affect very badly the business of beekeepers and the production of honey in Europe and all over the Muslim world.

Urgent preventive measures are needed now in order to stop all the ways which can lead to the contamination of honey with GM pollen, directly and indirectly. Honey bees are known to travel long distances(up to 9.5 kilometres). Researchers in Japan have demonstrated that maize can cross-fertilise at distances of at least 1200 metres. Besides, our innocent bees are suffering a lot of diseases and sudden deaths, which have led to drastic reduction of honey in most parts of the world.

European Muslims have many Islamic reasons to protect the bees from any contamination with GM pollen and to have PURE NATURAL UNCONTAMINATED HONEY. We have a whole chapter in the AL QUR'AN titled THE BEES (AL-NAHL) which is chapter 16. In this chapter, there is a clear holy verse (69),talking about the treatment and cures (Alternative medicine) in consuming PURE natural honey, as GOD created and wanted, and not contaminated by GM pollen or any other as is happening today . . .

Medically too, PURE HONEY is highly nutritious to anyone who consumes it. There are millions of people who are working as beekeepers and many do it as a job for income and survival. No doubt, the contamination of honey by GM pollen, will "interfere" with the natural Healing and the Nutritious effects and health benefits of honey, and will add to the world of bees, who are already dying and suffering, a new man made disaster.

European Muslims and Muslims generally have a lot of concern and are very unhappy about the GM industry, which changes GOD's BEAUTIFUL NATURAL BALANCED SAFE HEALTHY CREATION – Bees and honey.

We therefore, the European Muslims, would like you, if you allow us, to take all strict and safe measures in order to avoid any contamination to any bee and to any honey in Europe. Strict controls should be taken too to avoid the import of any honey to any European country, which has been contaminated with any GM pollen. LABELLING is a must, if there is any contamination or any risk of GM pollen, in any honey sold on the market.

Informed choice is the right of every consumer in Europe. We are requesting and demanding the avoidance of any contamination of any honey by GM pollen on:

-Religious grounds
-Health grounds
-Economic grounds
-Environmental grounds

-Animal welfare grounds, in order to protect the bodies of these weak defenseless holy creatures: THE BEES.
-Consumers rights and grounds

We wait anxiously to hear your response and to know hopefully, about the urgent measures and actions taken in order to stop this serious neglect and contamination of our holy bees and honey, just for the sake of the satisfaction of some greedy business companies who care only about their profits at whatever the cost!

Thank you for your help

Yours faithfully
Dr A Majid Katme(MBBCh,DPM)
Spokesman: Islamic Medical association/Uk

Getting Rid Of SHB

Recently a visit from grandson of Delano TN tells me his method to control the Hive Beetles that works to break up their cycle. Had spread hydrated lime under the beehive and about two feet in front of the hive. He didn't say how many times he does it per season. Another way would be to use Basic H, diluted and sprinkled under and around the hives. That may be a little more environmentally friendly and serve the same purpose.

Recently I have made pans in old bottom boards that I had cut out for screens – pans with oil. This has caught an amazing amount of the Beetles.

Thanks for answers to this and I look forward to seeing the step by step life cycle of the Hive Beetle in your magazine.

Marvin Rhodes
Scottsville, KY

Editor's Note: *See the January issue for Mike Hood's FREE book on Small Hive Beetles.*

Rattlesnake Risks!

In many parts of Montana, rattlesnakes are common. They seem to like holing up under the pallets used by our commercial beekeepers. I never walk up to a pallet without checking, and I try to stay on the side of the pallet that is solid wood.

Those of you who know me, also know I often wear western boots. That's a two-fold affectation.

1) I grew up around livestock (cows). You want boots with a heel for safety when working cattle from a horse. We also did custom baling and stacking, at a time when that was still mostly hand work. Snakes in and under bales, especially straw bales in our dry land areas, were a common hazard,

2) I like ankle protection in snake country. Boots may not be bite proof, but they offer a degree of resistance – especially since I buy bull hide boots.

Steel toes, hard heels, and a loose fit on the uppers (acts like bee suit – material stands away farther than depth of sting or bite) reduce chance of bite going through.

Boots also eliminate ankle stings. A trick I picked up from Roy Thurber, cut rubber bands from a tire inner tube. Loop rubber band around leg, In front of your leg, Twist band to form a Figure 8, then pull the lower loop of the 8 over your toe, up to just in front of the heel. Simple solution to crawling bees.

Jerry Bromenshenk
Montana

State Challenge

People are aware of beekeeping as never before. Seize the opportunity, legislatively. The North Dakota Legislature, in 2011, authorized $75,000 to fund bee research. The ND Beekeepers Assn. contributed another $25,000, creating $100,000 in bee research funding. Legislators are people; and people are aware of the honey bees. I challenge you to work on your state legislature.

Beekeepers seeking legislation to fund bee research will succeed by keeping it simple. ND beekeepers worked closely with the ND Dept. of Agriculture. The State Bee Inspector spoke on behalf of our legislation. The bill was drafted by ND Legislative Council, not beekeepers. We approached key legislators, of both parties, in both houses with preliminary drafts, seeking their support. In ND, the Agriculture Committee sets the legislative Ag Policy. The Appropriations Committee funds the Ag. Committee recommendations. The same procedure is followed by the Senate. A bill has four chances to be killed before getting to the floor. Craft a good bill.

Beekeepers should have skin in the game. The ND Honey Promotion fund is only $.10 per hive, per year. 1000 hives = $100.00. In ND that's about $40,000 a year. The money is collected with the application for the annual $5.00 beekeeping license. It is voluntary. Legislators want to see beekeepers voluntarily participate in research funding

Several well-meaning groups are capable of conducting bee research. The ND beekeepers considered a number of research organizations and chose Project Apis m (PAm) and the University of Minnesota. PAm is chaired by Dan Cummings, and consists of a board of respected industry leaders. The University of Minnesota has an award-winning program, headed by Dr. Marla Spivak.

State beekeeping organizations – accept the Challenge! Agriculture is important, crops are important and honey bees are vital to your state's economic well-being. Convince your legislature to target funds for this worthy cause. Seek guidance from state Agriculture Department personnel. For instance, it is possible to make bee research awards without the award being subject to administrative fees.

Legislators and beekeepers will insist on transparency. Be prepared to tell legislators how taxpayer money is being spent. In ND, the Commissioner of Agriculture gives final approval to the beekeepers research recommendations. It is important to keep our Commissioner informed.

Demonstrate to legislators and the state Ag Department that funding spent on honey bees, even if targeted to out-of-state organizations, will benefit bees in your state. Show the migratory nature of the business and the importance of your state in that effort. For instance, ND gets closer to CA every year. What happens in ND in the Summer directly impacts what happens in California the following Spring. Other states are no different.

Colony health issues are paramount to beekeepers survival. We are losing the war and need an infusion of research funding now more than ever. The 2011 U.S. honey crop is small. Every year, we lose 30% of the national herd of honey bees. It is unsustainable. We need to pull out all the stops to combat *Varroa*. We need to track down every possible lead to find products and management options that will offer solutions to honey bee pests, diseases and nutritional woes.

Please accept the ***State Challenge*** to fund bee research among the states. ND does $100,000 a year. If 20 states did the same, we'd have $2,000,000 for bee research. Let's go for $2 million. For bees.

John Miller
Gackle, ND

INNER COVER

Starting in December, even earlier for some beekeepers, into January and this month too, beehives by the thousands began arriving in California. They come early because California Januarys are much nicer than Minnesota Januarys. Most came through the Needles Border Station, some with ease, some with great difficulty. The border issue is that California doesn't want any pests it doesn't already have, and doesn't even want more of those. So every beehive-carrying truck has to be inspected for things like fire ants, crazy ants, and other not-wanted-here ghoulies. Waiting for Godot seems more the rule than the exception, as station staff, though mostly sympathetic to the beekeepers operate by specific time clocks, and the people they have to deal with, those somewhere else who have to identify those unwanted pests and predators sometimes found on trucks, have even less cooperative schedules. So a truck sits and waits, and if it's hot, bees die in the sun. Mostly, they turn around and go home before that happens.

Once through though, they head for holding yards. Southern California has lots of spare room it seems, so finding a spot for 400 or so hives can be managed, often on land the almond grower doesn't have trees on yet. Then it's sit and wait time. But bees have to eat. In fact, they have to eat a lot to get the population up to almond pollinating standards, so there's a lot of feeding going on. Sugar syrup and protein feeding is pushed hard. Brood and bees are needed and as the cover shot shows, there isn't a green speck of anything to forage on.

Almonds. Let me share some almond crop information. According to the California Almond Board it costs about $3900 to manage an acre of almonds. Production costs are $1752/acre or about 45% of the total, including pruning, weeding, cleaning, pollination, irrigation and fertilization, disease, insect and gopher control. Of that cost, pollination runs about $280/acre, or 16% of the production cost.

The rest of the cost/acre – about $2150 – is taken up by land costs at 19%, overhead at 11%, trees and equipment at 16%. Overall, pollination costs/acre are a mere 7%. A couple of drops in the bucket.

There's about 124 almond trees/acre, producing on average about 7300 nuts/tree, which comes to just over a ton of almonds produced per acre. This varies by variety, by year and by county, but it a good working average. How many acres? It's a growing concern, certainly. In 1982 there were 339,000 bearing acres. A decade later there were 401,000 bearing acres. Another decade and 545,000 bearing acres, and by 2011, 750,000 bearing acres of almonds, but when you add those acres not yet bearing but will be in a couple years or so...right now there's about 850,000 acres (about 1300 square miles, or essentially all of Rhode Island) of almonds in California.

Crop insurance standards require that growers have two colonies/acre for pollination to insure maximum crop set. At 750,000 acres, that's right about 1,500,000 colonies needed by the almond industry this month. Right now. (and in a couple of years, they'll need 1,700,000). Going by the USDA's colony count data, there were right about 2,600,000 colonies in the U. S. in 2010, meaning that about 58% of all the bees in the U. S. are sitting in one of those fields somewhere in the Golden state, right now, waiting for all those acres of almonds to start blooming.

You many think this is a wonderful show to watch, but it doesn't have much to do with how you keep bees, what's happening in your state, the price of honey, the cost of equipment or how hard it is to just keep bees. But you are dead wrong on every count. What happens in California in the next six weeks affects every aspect of everything bees in this country for the rest of the year. In fact, it has a major affect on the entire beekeeping industry for beekeepers everywhere. It is the largest, single beekeeping event on the planet, and the ripples from these orchards affect every thing that happens down stream...from those hold-ups at Needles, to how long the bees have to sit in holding yards, to thefts from orchards, to the temperature every day, to the price of the bonus, to the price of honey, to the price of queens and packages, to the price of sugar syrup to the price of equipment. Everything.

Yes, even the single backyard, top-bar beekeeper will feel ripples from these almond orchards.

So, for the next three months come along with *Bee Culture* as we explore all of this story – from Bakersfield to Sacramento and everything in between – the Almond Board's forage plots, beekeepers, almond growers, researchers, queen and package producers . . . Follow us on *Bee Culture's* Almond Odyssey.

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Varietal honey. Let me explain exactly what I mean by that because sometimes there's some confusion. And some folks haven't thought

Almond Odyssey; Varietal Honey.

about it much, so I think we need to explore it.

Varietal honey is honey produced from the nectar collected and distilled from a single plant source.

It works like this. Because you have been taking good notes for several years and have followed all the phenology data on various web pages (**http://phenology.osu.edu/**, is the best there is but there's lots of this type of info for where you are.) and because you know a forest full of wildlife experts, park rangers, other beekeepers and gardeners, you'll know, using all those notes, the information gleaned from all those experts, and the growing degree day data you've collected and sorted and sifted, when some major honey plant is due to bloom in your immediate area. To the day. The. Very. Day.

Does it get any better than that?

So when you know, to the day, the very day, when ... say, that long, long fence row of honeysuckle is ready to burst into bloom what do you do? If your bees are close by all that treasure all you have to do is remove those honey supers you have on now, add a queen excluder and then pile on the empty honey supers in anticipation of all those bees you've produced collecting all that honeysuckle nectar, filling all those supers with honeysuckle honey, then covering it all with glistening white cappings, then harvesting it all in one fell swoop before anything alien or foreign gets placed there too, and producing buckets and bucket of pure, unadulterated, wonderful honeysuckle honey. That's what I call varietal honey. Honey that's made from a single-source of nectar, unmixed with any other nectar, syrup or even the thought of such. Pure, simple, elegant, honeysuckle honey.

And it works. You can do this if you are in the right place at the right time with the right number of bees the right age. It happens all the time. But there's a catch of course...the right place at the right time with the right number of bees the right age. You have to know when your crop will bloom so you can prepare...weeks ahead of time...then get everything ready right on time.

A few things can get in the way of that simple formula though. The first is that you forget, but we won't mention that. The biggest problem is that you don't have the bees necessary for the job. Early crops...the best in my opinion like locust or maple, can be tricky. So you have to do the math and get bees ready on time, with lots of foragers looking for something to do just when there's something to do. Too, bees try very hard not to put all their eggs in one basket. They will take full advantage of the fact that there is a ton of honeysuckle blooming not 50 yards from where they are, and they'll harvest nearly a ton of it. They're not dumb. But deep inside Food Central one of the mid-level recruits suggests that maybe they should be looking for an alternate food source because remember a couple of weeks ago when we thought we had it made with all that willow and maple down by the creek and bang! One day it was all gone when the bulldozers came? And where were we then, huh? Flat out of food for about a week, that's where, because nobody had been prepared. So, you guys go gather your honeysuckle, but me and my team here are going to stay on that bunch of white clover, 'bout a mile east of here, in that new complex of houses that don't have chemicals on their lawns yet. And it's pretty good stuff...more sugar per load than your honeysuckle, that's for sure, even if there's not as much of it...you do your thing, we'll do ours.

So, midst all that wonderful honeysuckle honey there's a bit of clover mixed in. Not much maybe, or a lot maybe...but your pure, elegant single-source honey has been diminished. Fouled by a clover conspiracy...but for all the right reasons as far as the bees are concerned.

You can see if that's happening if you're patient and careful. Simply watch the front door for a time and see where foragers go and when...what direction that is...and time of day, and watch them coming back, what color pollen and what time of day. You got lots of time on your hands you can track them...beelining isn't that hard, and it can be very revealing. That will tell you, in a general way, about how much of both you are getting by looking at the percentage of bees going east compared to those going west when they leave. You can also, if you have even more time to kill, go over to that stand of honeysuckle with a powdered sugar duster, and sprinkle a little on as many foragers there as you can find, then hurry back or have an accomplice watch for those powdered bees returning. How many sugared bees come back will give you a clue to how many went. Thus, how many that came back weren't sugared...they went somewhere else, right?

You can, if you have the resources, do a pollen analysis of the honey you have in that hive. With the right tools - a good microscope and some references on what honeysuckle pollen looks like – you can tell, with some accuracy, how much of your honey is really from honeysuckle. Simply, count and identify the pollen grains you find from a representative honey sample and see....mostly, some or hardly any pollen from honeysuckle...if more than 50%, you're in. It's honeysuckle.

Of course you may be in a location that simply never has enough of any one kind of crop to produce a single-source honey...what I call a desert of delight. Not a chance in heck to make a drop of varietal honey. You live where you live, and if that's where you live then you have to make lemonade from the lemons your local environment has handed you. We'll talk more about artisan honey later, but if this is your lot in beekeeping life so be it. Varietal isn't for you.

So, varietal honey. It's worth a lot more than that pedestrian wild flower you've been making all these years..it's better, it has more value, and if you've not capitalizing on it...if you can make it...then you're missing the boat on making more money from your honey. Next, labeling varietal honey, and making the best out of that artisan crop you have.

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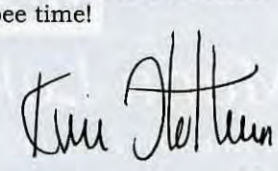
Stay tuned to the blog at http://blog.beeculture.com/, and if I'm lucky I'll dust off our twitter and facebook pages, maybe the BUZZ, and even our web page for updates on T***he Almond Odyssey – from Bakersfield to the Northern California Queen Yards***. Stay tuned.

It's February already. You better get it in high gear. Spring is here. Get your veil, your hive tool and that new smoker. It's bee time!

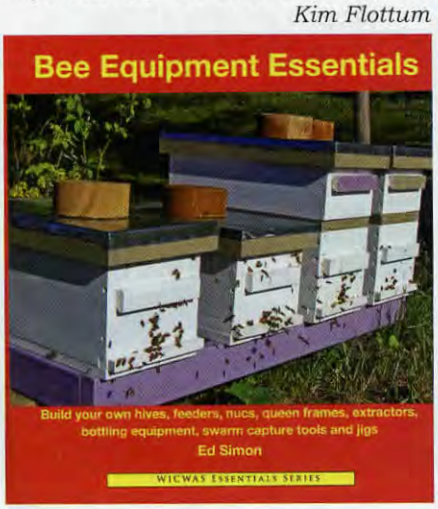


Some Help To Get Ready For Spring – Look What's New!

Bee Equipment Essentials, by Ed Simon. Published by Wicwas Press. ISBN 978-1-878075-27-7. 9.25" x 8.5", soft cover, color throughout. $20.00 in the U.S. **www.wicwas.com**.

If you've been reading this magazine for any amount of time you are already familiar with Ed Simon's making equipment articles. We try to get several a year published because they are well done and focus on useful pieces of beekeeping equipment. Ed is a computer programmer, now retired, and active beekeeper in Minnesota. Many beekeepers make some of their equipment, and would make more if they had the time. It saves money, you can choose the quality you want, the style you want, and make improvements if you like. And, like many of us, you can look at the diagrams, the pictures, the instructions and go – sure, I could do that. Ed's articles make it all look so easy – and using Ed's tricks most of these projects are. Projects include a complete hive, nucs, queen rearing equipment, honey handling equipment including an extractor, swarm capturing, a plethora of jigs and carpenter helpers, and a crash course in dumpster diving. If you are intent on making equipment here's a great place to start. But even if you never pick up a hammer...for me, a hammer should be considered a dangerous weapon and not a tool...you'll enjoy Ed's banter and insights. Even if you never, ever build anything.

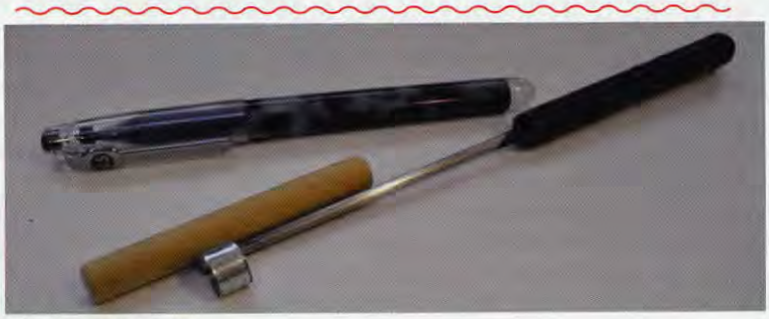
Kim Flottum



Ball RedBook, Volumes 1 & 2. 18th edition. Published by Ball Publishing. 7" x 10". Vol. 1, Greenhouse Equipment, 262 pgs.ISBN 978-1-883052-67-6, $54.95. Vol. 2, Crop Production, 784 pgs. ISBN 978-1-883052-68-3. $73.95. Both black and white, hard cover. **www.ballredbook.com.**

You've probably never heard of these books – actually, most of the previous editions were a single volume but they've divided them because there's so much information now on both subjects that a 1000 page book this size gets heavy. My undergrad years were spent in greenhouses. I took classes in them, worked in them, did research in them. I had 10 green fingers – still do by the way. These books are the Bibles covering greenhouse facilities and greenhouse crops. These are floriculture books, written by floriculture experts – hundreds made contributions to these books – for people in the greenhouse business. But why in a beekeeping magazine? I'll tell you. There will come a time when the beekeeping industry will finally have to stop relying on other peoples polluted land, poisoned and inadequately nutritious crops and start growing their own honey bee forage . . . not so much for the crop of honey to be harvested, though that's possible, but for the safe, natural pollen and honey their bees need before and after pollinating for money. A safe and sane place to put your bees for a time, where they won't be sprayed, exposed to GM crops, or starved to death because of drought or monoculture. Twenty acres, planted with the right crops and managed correctly can support almost 200 colonies, produce several harvestable crops for additional income, improve the land, provide food and habitat for innumerable pollinators and wildlife, and be completely sustainable while being profitable at the same time. And these books tell how to make that happen. Well, part of it happen. You'll need tractors and harvesters and more, but you won't need anything, and you won't have any bees to feed anyway, if you don't have the plants in the first place. Start here.

Kim Flottum



Whole Punch Tool

If grafting larvae isn't fun anymore because you simply can't see those tiny C shaped larva, there's hope for you yet. People have been raising queens using the cell punch method for years. Using a device that encircles the cell the larva is in, then, when pushed down through the comb the entire cell is removed – no more magnifying glasses needed. The removed cell is then removed from the cutting edge of the punch using the dowel and then fastened to a cell holder on a cell bar, and the entire unit placed in a cell building colony. This part of the process is straight forward, it's just getting the larvae into the colony – and this the tool to do it with. Available from Bill Huston, 410 N Ewing Street, Lancaster, OH 43130 for $15.00 including U.S. postage. Brochure and instructions. **www.carriagehousebeeproducts.com**.

Package Shaker Box

If you've ever shaken packages, or watched anybody shake them, then you right now see the advantages of using this style shaker box. Made of stainless, this three part unit has an excluder wire basket on the top so the queen doesn't get away. This sits on the funnel which has a spring loaded opening at the bottom that opens when the funnel is set on the bottom box, and closes when it is removed so loose bees don't get away, and a bottom box with a slide open door on one side to dump bees out of the bottom box and into the package. Bees can be shaken frame by frame if you'd like, or a whole super put on top and the bees bumped or smoked down. It is fast, reliable and incredibly efficient...if anything in the bee business can be called efficient. Made for years by Greg Lorenzo of Gregg's Heating and Air Conditioning and Metal Fabricating, 740 East Walker St., Orland, CA 95963. Price is about $700.00, depending on individual specs and shipping weight about 50 pounds, depending on customization. Call 530-865-9677 for info. Dealers welcome.

The Bee-friendly Beekeeper. A sustainable approach. David Heaf. 6.5" x 9.5", soft cover, color throughout. 150 pages. Published by Northern Bee Books. ISBN 978-1-904846-60-4. **www.groovycart.co.uk/beebooks** or **jerry@recordermail.co.uk**. $37.50.

This book evolved from a series of articles the author published in The Beekeeper's Quarterly, a journal you may have seen advertised on these pages. It is definitely British in flavor, but the information is universal. The value of the book is in the concepts that have become quite clear of late – in books on advanced beekeeping and articles written by researchers and beekeepers keen on staying in business. Bees need a safe place to live, that is - proper shelter with clean, adequate comb to live on, enough good food to eat, an opportunity to live as stress free as possible, some protection from pests and disease if necessary, and management by beekeepers that works with their life style instead of with the beekeeper's life style. Heaf's argument is that hives without frames offer the best opportunity for this to occur...the Warre hive and other similar types. One has a hard time arguing with the concepts offered, certainly. And on a non-commercial scale the type of hives are less important than some give them credit for. So if you want to explore this aspect of beekeeping, here's a good place to start.

Kim Flottum

Beeconomy. What Women and Bees Can teach Us about Local Trade and the Global Market. By Tammy Horn. Published by University Press of Kentucky. 6" x 9", 376 pgs., B & W throughout. ISBN 978-0-8131-3435-2. Hardcover price $29.95. ebook version available.

On the back cover of this book there are two blurbs describing what you will find inside this book. The first reads:

"In these pages, Tammy Horn takes you on a global, first-class ride that explores the geography, history, culture, economy, and influence of the beekeepers of the world who raise both bees and children – women. Horn has gathered in one book many special, shining examples of the thousands of beekeeping heroines that have been mostly overlooked in the histories written by men. Finally, these women are all in the light." I wrote that about a year ago when I was asked to read an early edition. It is a good summary of what is in this book.

Francis Ratnieks, a Cornell graduate who studied under Roger Morse, and is now in England, wrote on the back: "This unique book tells the story of women in the world of honey bees and beekeeping, from the prehistoric times to today and across every continent where honey bees are found."

Neither of us, it seems, came up with the idea of what women can teach us about local trade and the global market. Editors, and publishers of all sorts need to always put a second title on books...it's the in thing to do. I sometimes wonder if they even read the books they publish. Though global in scope, the global market isn't the force behind this book. But women and bees certainly are. And Tammy had offered a much, much better title, that for now stays unclaimed.

She does explore the globe though, and talks to the women of the places who take care of the bees where she goes...Africa and African bees (taking a whiz while working African bees is difficult), India and the after effects of British Colonialism, Asia and Russian and other outside influences, Europe, with its long history with bees coming from the south moving north and east and west, and of course much on the modern relationships of honey bee research there carried on by many famous women, and North America, with both its historical side...women crooks and women heroes, and the plethora of women in beekeeping business and research today, migratory Australia is as difficult as it can get, and then South America and its cultural challenges for the future.

The conclusion, though, is the gem, bringing together the market, the people and the future: "Creating a new economy is not easy. Cultural challenges such as religion and politics have to be negotiated. Even when women attain higher education, their degrees do not level the pay threshold. Similar approaches will not be possible in the short term for every continent. However, the time is right for a new economy – perhaps a new form of time – in which women and environment count. Counting for nothing gets old after a while.

It's Summers Time —

A Word About Honey Shows

Have you been to a Honey Show lately. Or maybe I should ask if you have seen a Honey Show recently. I ask because in the U.S. we don't typically have Honey Shows that are an event in themselves. Our Honey Shows tend to be a part of another activity – a beekeeper's conference or a county or state fair.

In the last few years I've been invited two different times to speak at the National Honey Show in London, England. It was a special treat in my life just to get to go to London, but being asked to speak was a real honor.

There is a big difference in the National Honey Show and the Honey Shows we have in this country. Now before I get started I want to let you know these are just observations on my part – I'm not saying one is right and one is wrong. I just want to bring to your attention the differences.

At the National in London the Honey Show is the event – the name says it all. There are vendors and there are speakers and in the last couple of years they've even added workshops. But the "Show" is still the highlight of the event. And it's huge compared to anything I've seen in this country. Now before you send me that email, I realize there may be some pretty big shows in this country that I haven't been to. But the show in London fills up two huge rooms. And if you visit the website – **www.honeyshow.co.uk** – you can see over 100 photos of the show and the vast majority of the photos are of the show. I saw only one photo of a speaker and it was when he was viewing the show, not while he was speaking. A few shots of the vendor area were included. It's just a different mindset. This is changing a bit. Like I said they've added workshops – new in the last three years. And it has become the custom of having a well-known American speaker as their keynote each year. Tom Seeley was the keynote speaker in 2011. Keith Delaplane, Jennifer Berry, Jim Tew and *Bee Culture's* own Editor, Kim Flottum are some of the U.S. speakers that have spoken at the Honey Show. They also bring in speakers from other countries. But make no mistake, the 'Show' is still the main event.

Judging at the National Honey Show in London, 2011.

In our country the speakers are the draw that get people to come to the meetings. The big name speakers get the attention. And often you have to hunt for the honey show. It might be in the vendor area or in a small room down the hall. It is not the main event. And even at the county fairs the Honey Show is just one part of a much bigger event.

The judging process is very different, also. At the National colored pieces of glass are used that are a dark and a light amber. So your honey isn't water white, light amber, amber, etc. Over there it is light, medium or dark. They don't use a polariscope, they use a 'torch,' actually a flashlight, to shine through the honey to look for dust. It works amazingly well. And it seems that taste is focused on more and in a more elegant way. Little gold or glass sticks are used to dip into the honey and then the honey is spread onto the side of your thumb for the tasting. A different stick is used for each honey. And the Londoners are much more formal. I served as a steward (helper) the first year we went over. Judges and stewards are required to wear a white coat and the steward's job is to hand them the tools they need and also to keep everything very clean during the process.

It takes most of a day to set up and then most of the next day to judge and then finally on the third day the show is open for viewing. And the winners of various categories have their names engraved on wonderful, shiny old silver trophies – that don't go home with them. It's a whole different atmosphere there.

There is a small group of folks in the U.S. that have been trained in the International rules. At the Young Harris Beekeeping Institute in Georgia each year they partner with the Welsh National Beekeeper Association in training honey judges.

The Honey Shows that I am familiar with over here have been in a steady decline these last few years. Fewer people with fewer entries. I'm not sure what has happened because we used to have grand Honey Shows in this country. At *Bee Culture* we have hundreds of old photos that show absolutely amazing displays. But not so much lately. At our local county fair we can't even fill up one cupboard at our Honey Show. And the same has happened with some of the larger meetings that I attend.

I suspect that it is a factor of not enough time, not enough honey, maybe not enough publicity. Also travel restrictions in the U.S. have made it difficult to get your honey to the big regional honey shows if you're flying.

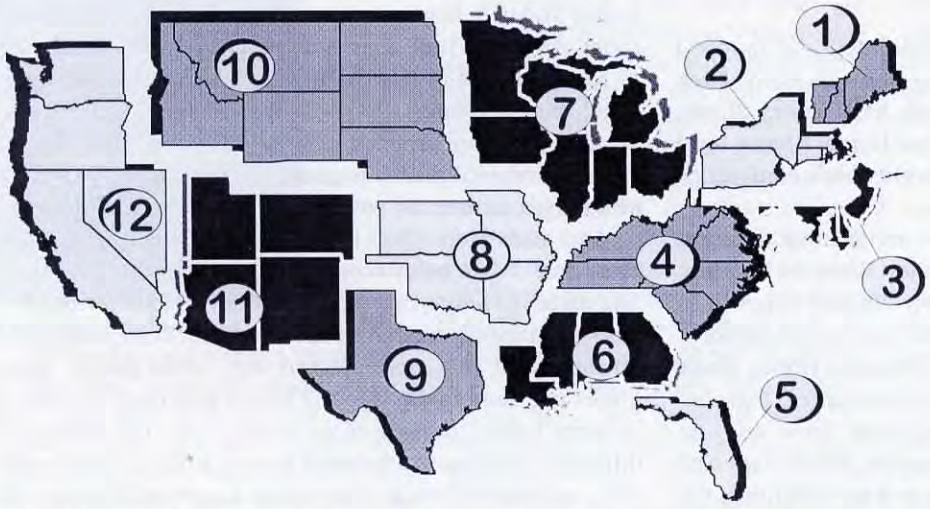
So what is the answer? Can we get back to having bigger Honey Shows in the U.S.? Do we want to have big, grand Honey Shows in the U.S. again?

I've heard that the Pennsylvania Farm Show has an impressive Honey Show – I haven't seen it. Lorain County, one of our neighboring counties has a very impressive Honey Show as part of their county fair each year.

So here's another question. What are the rest of us not doing or what could we be doing better? More promotion, more education within our county and state groups, better prizes, more attention – I don't have the answers?

Kathy Summers

FEBRUARY – REGIONAL HONEY PRICE REPORT



Everything but the Buzz, and even that if we could figure out how to harvest, process and sell it.... that's the feeling of a lot of beekeepers who keep bees for both fun and profit. But how to make money keeping bees when it seems that all you do is put money into that box, and don't seem to get nearly as much out?

Our reporters seem to be making it work, and they're doing it by making and selling everything and anything they can glean from the bees, and the beehive. Our chart lists most of the harvestable products from bees that beekeepers can make, use and sell. And the numbers show the percent of our reporters who are doing just that. We now have three years worth of data and you can see already the slight changes our reporters are making.

There's no doubt that producing and selling value added products is one way to go, and for a small scale producer it's probably the best way to go. Using beeswax for candles, ornaments, lotions, potions and creams takes a commodity product and doubles or triples its value. Specialty honeys...cremed, comb and the like sell for more than honey in a jar, so consider those, too when producing your product.

The sideline jobs...producing queens, packages, nucs, pollination, selling supplies of all kinds, and even buying product from other beekeepers and reselling, something like honey stix, isn't a bad idea.

There's more than one way to get the buzz out of your bees, and you don't have to squeeze so hard it hurts the bees in the process.

There are other products, of course. Our reporters were asked – what else? Royal jelly, honeyed popcorn, honey sweetened apple butter, honey candy, candle supplies, bee removal, flavored creamed honey, honey butter, honey mustard and flavored honey.

	Candles	Ornaments	Wax Blocks	Honey Stix	Pollen	Propolis	Bee Supplies	Packages	Queens	Bulk Wax	Lotions	Soap	Creme Honey	Liquid Honey	Comb Honey	Chunk Honey	Nucs	Pollination	Bee Feed	Other
% Reporters Selling																				
2010	28	17	54	28	28	13	20	9	15	48	20	10	35	90	66	38	28	-	-	-
2011	39	20	53	39	35	21	21	10	15	42	19	11	35	90	67	40	26	37	10	18
2012	35	21	53	37	32	15	53	10	22	44	18	13	21	94	62	34	23	32	7	48

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12			Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS													Range	Avg.		
55 Gal. Drum, Light	1.72	1.95	1.72	1.62	1.80	1.72	1.70	1.72	1.80	1.70	1.65	1.76	1.62-1.95	1.74	1.74	1.65
55 Gal. Drum, Ambr	1.70	1.75	1.70	1.55	1.75	1.61	1.74	1.70	1.60	1.70	1.59	1.70	1.55-1.75	1.67	1.67	1.56
60# Light (retail)	145.00	180.00	149.00	144.40	160.00	167.50	177.75	165.00	150.00	140.00	158.00	151.00	140.00-180.00	157.30	147.96	141.89
60# Amber (retail)	145.00	153.50	149.00	148.50	160.00	152.50	161.00	165.00	127.50	161.05	154.50	148.00	127.50-165.00	152.13	143.45	139.49
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	63.36	97.98	68.00	61.80	79.63	60.00	51.48	79.63	79.63	49.92	58.50	95.00	49.92-97.98	70.41	63.57	58.33
1# 24/case	115.20	85.57	81.60	78.15	84.00	99.31	83.61	96.00	82.00	111.30	90.90	113.60	78.15-115.20	93.44	92.44	77.87
2# 12/case	114.30	90.83	75.90	72.33	78.00	81.76	70.01	93.00	71.00	86.16	73.00	92.75	70.01-114.30	83.25	80.81	72.55
12.oz. Plas. 24/cs	78.24	81.55	64.20	75.60	67.20	82.00	66.31	94.80	66.00	64.08	73.60	78.80	64.08-94.80	74.37	75.43	68.04
5# 6/case	121.00	94.98	89.25	78.68	90.00	133.00	84.84	105.00	72.00	88.98	70.29	103.33	70.29-133.00	94.28	89.41	78.90
Quarts 12/case	119.84	117.73	142.80	111.00	119.84	107.15	107.40	105.00	119.84	137.48	103.23	127.33	103.23-142.80	118.22	118.50	105.67
Pints 12/case	75.72	69.95	81.60	71.20	68.00	62.14	80.51	87.00	65.00	110.00	65.25	77.67	62.14-110.00	76.17	74.38	69.39
RETAIL SHELF PRICES																
1/2#	3.00	3.98	2.87	3.65	3.58	3.00	3.26	3.58	3.58	3.60	3.70	5.00	2.87-5.00	3.56	3.35	3.32
12 oz. Plastic	3.75	4.55	3.55	4.06	4.29	4.38	3.70	5.00	4.00	3.72	4.48	5.16	3.55-5.16	4.22	4.24	3.95
1# Glass/Plastic	5.50	5.24	5.54	5.17	6.00	5.95	4.98	6.00	5.00	5.44	5.30	6.25	4.98-6.25	5.53	5.51	5.24
2# Glass/Plastic	10.00	8.49	8.33	9.03	9.50	9.13	7.71	10.00	7.50	9.78	8.64	12.33	7.50-12.33	9.20	9.25	8.46
Pint	8.51	6.82	11.00	6.97	6.85	6.81	7.80	8.75	7.00	8.35	7.62	9.38	6.81-11.00	7.99	7.88	7.81
Quart	12.70	9.90	10.63	11.70	12.00	11.38	11.42	14.00	12.70	14.27	11.61	17.00	9.90-17.00	12.44	13.52	12.12
5# Glass/Plastic	23.75	20.36	21.96	19.85	23.00	25.00	18.45	22.00	18.00	20.12	18.46	25.00	18.00-25.00	21.33	19.01	18.60
1# Cream	6.70	5.98	6.50	6.13	6.70	5.75	6.29	6.70	6.70	5.39	6.45	8.50	5.39-8.50	6.48	6.43	5.76
1# Cut Comb	7.50	5.98	7.80	5.99	8.67	6.85	7.96	8.67	8.67	10.50	8.50	12.66	5.98-12.66	8.31	7.71	6.89
Ross Round	6.50	6.95	7.80	5.92	7.55	6.50	7.16	7.50	7.55	7.55	9.00	8.99	5.92-9.00	7.42	7.53	6.44
Wholesale Wax (Lt)	3.25	5.63	2.75	3.67	3.10	5.77	6.00	5.00	3.25	6.00	3.48	3.75	2.75-6.00	4.30	4.34	3.79
Wholesale Wax (Dk)	3.00	5.10	2.63	3.35	2.50	4.50	5.25	4.75	3.50	5.34	2.82	3.80	2.50-5.34	3.88	3.76	3.14
Pollination Fee/Col.	90.00	112.50	72.50	51.60	55.00	66.67	55.00	75.00	91.18	91.18	77.75	120.00	51.60-120.00	79.86	78.62	83.89

A Closer Look

CHALKBROOD II

Clarence **Collison**
Audrey **Sheridan**

Chalkbrood disease is typically most prevalent during the Spring, given that fungal growth is enhanced in cool and humid (poorly ventilated) beehives.

Chalkbrood is a fungal disease of honey bee brood caused by *Ascosphaera apis* (Maassen ex Claussen) (Spiltoir and Olive 1955). This disease affects worker, queen and drone larvae. Although fatal to individual larvae, the disease does not usually destroy an entire bee colony. However, it can cause significant losses in terms of both bee numbers and colony productivity. Hygienic nurse bees can efficiently recognize and remove chalkbrood diseased larvae, and therefore, most colonies recover spontaneously (Aronstein and Murray 2010). Colonies and even patrilines of a single colony have shown to vary in susceptibility (Invernizzi et al. 2009, Jensen et al. 2009), as well as hygienic behavior (Arathi and Spivak 2001). This disease is now found throughout the world, and there are indications that chalkbrood incidence may be on the rise (Aronstein and Murray 2010).

Ascosphaera apis only produces sexual spores and is heterothallic, thus spores are only produced when mycelia of the two opposite mating types come together and fruiting bodies are formed (Aronstein et al. 2007). Honey bee larvae primarily get infected by ingesting these spores with their food. Spores germinate in the lumen of the gut, probably activated by CO_2 (Heath and Gaze 1987, Bailey and Ball 1991). Infected larvae rapidly reduce food consumption, and then stop eating altogether. Theantana and Chantawannakul (2008) recently identified several enzymes produced by *A. apis*, some of them implicated in assisting the pathogen in penetration of the peritrophic membrane of the bee larval midgut.

In nature, development and growth of *A. apis* strictly depends on the nutrients obtained from honey bee larvae (Aronstein and Murray 2010). Germination of spores requires very specific conditions that are found in the larval gut environment (Bignell and Heath 1985). The temperature and pH in the larval gut may have a major effect on the viability and germination of fungal spores (Bamford and Heath 1989).

After penetrating the gut wall, the fungal mycelium grows inside of the body cavity, eventually breaking out through the posterior end of the larvae (Nelson and Gochnauer 1982, Koenig et al. 1987). Death occurs as a result of mechanical and enzymatic damage, disruption of hemolymph circulation and general toxicoses (Glinski and Buczek 2003). *A. apis* vegetative growth extends from the posterior end to the anterior end of the larva, eventually covering the entire larva with a thick layer of white mycelium. Later, fungal growth is mottled with brown or black spots, due to production of ascomata that may vary in size and color. Honey bee cadavers are usually found stretched out in the cells in an upright condition, swollen to the size of the cell. Eventually cadavers dry and form so-called chalkbrood mummies which may be white or black, depending on whether or not ascospores are present. Each black mummy contains about 10^8-10^9 ascospores (Aronstein and Murray 2010). Microscopic examination of white mummies reveals primarily cellular debris, mycelial fragments, but no detectable ascomata or ascospores (Gochnauer and Hughes 1976). It has been suggested that white mummies are due to infection with mycelia of a single mating type (Aronstein and Murray 2010).

"The rate of disease incidence is likely dependent on a particular fungal strain's level of ascospore production, the rate of spore germination, and the efficiency of spore dispersal (Aronstein and Murray 2010)."

A. apis is lethal for honey bee larvae regardless of rearing temperature. Larvae become infected four days after exposure to chalkbrood spores (Gilliam et al. 1978, Vojvodic et al. 2011). The first signs of infection occasionally can be later when prepupae are sealed in their cells, particularly after a short cooling period. These late infections probably reinforce spore production and dispersal within hives, increasing the disease pressure. Vojvodic et al. (2011) found that cool temperatures by themselves do not enhance mycelia growth of *A. apis* and that the optimal temperature for mycelia growth on agar was similar to the average temperature in the hive (34°C). These results imply that the optimal temperature for successful infection and maximal mycelia growth are different.

Spores of the pathogen are nearly ubiquitous and external factors like the suboptimal temperature of the brood (Bailey and Ball 1991) influence outbreaks. Hedtke et al. (2011) after monitoring 220 colonies in 22 apiaries for over six years identified additional pathogenic factors associated with chalkbrood outbreaks. *Nosema ceranae* infection in the Spring and *Varroa* mite infestations in the Summer were significantly related to chalkbrood outbreaks during the following season, suggesting that infections by these pathogens might render colonies prone to outbreaks of chalkbrood.

Chalkbrood disease can be spread by feeding healthy colonies pollen collected from chalkbrood infested colonies (Moffett et al. 1978). Therefore, Hale and Menapace (1980) investigated the effects of long-term storage, such as might occur with commercially purchased pollen, on the viability of the fungus. Four storage temperatures were used: -12°C, 1°C, 40°C and ambient room temperature (range from 21° to 27°C). These temperatures were chosen because they are relevant to field conditions and temperatures within a hive of bees. Three storage methods were also tested: dry test, wet test and pollen test. Results showed that *A. apis* when stored wet at 40°C for longer than one month, was rendered non-viable; similar material stored at room temperature remained viable for at least six months; and material stored at -12° or 1°C retained viability throughout 12 months. In contrast, the pathogen stored dry or with pollen remained viable for at least 12 months, regardless of storage temperature. Since *A. apis* remains viable for at least one year when stored at a temperature lower than 27°C (room temperature), contaminated pollen and beekeeping equipment over wintered normally might well be a source of infection the following season.

To combat a fungal disease like chalkbrood, the honey bee has developed individual as well as social immune systems. Nurse bees engaged in hygienic behavior remove diseased or dead larvae and pupae from both uncapped and capped cells and either cannibalize them or dump them outside the hive. This behavior is especially important in avoiding, controlling and eliminating a ubiquitous opportunistic pathogen like *A. apis*. Any malfunctioning of the bees' nest hygiene in general is likely to facilitate outbreaks and intracolonial spread of chalkbrood (Hedtke et al. 2011).

Hygienic behavior, in which individual honey bees detect chemical stimuli from diseased larvae and subsequently remove the diseased brood from the nest, is one type of social immunity that reduces pathogen transmission. Three volatile compounds, collected from larvae infected with the fungal pathogen *Ascosphaera apis* and detected by adult honey bees were identified. These three compounds, phenethyl acetate, 2-phenylethanol, and benzyl alcohol were present in volatile collections from infected larvae but were absent from collections from healthy larvae. Two field bioassays revealed that one of the compounds, phenethyl acetate is a key compound associated with *Ascosphaera apis*-infected larvae that induces hygienic behavior (Swanson et al. 2009).

While adult bees are not susceptible to this pathogen, they can transmit the disease within and between beehives. Transmission of infectious materials between adult bees within the colony appears to be via food sharing. Fungal spores can be carried by foraging bees and passed onto larvae by nurse bees feeding them with contaminated food. Transmission between managed colonies is mostly beekeeper assisted due to contaminated materials (Gilliam and Vandenberg 1997). Because spores can accumulate on all parts of the beehive and in all beehive products (e.g. foundation wax, stored pollen and honey) and remain viable for at least 15 years, any hive material contaminated with fungal spores will serve as a long-lasting source of infection (Gilliam 1986, Gilliam and Taber 1991, Anderson et al. 1997, Flores et al. 2005a,b).

Disease expression requires the consumption of fungal spores and a predisposing condition in the susceptible brood. *A. apis* spores within sheets of wax foundation could be a source of inoculum leading to chalkbrood, but it is also possible that these spores remain confined in the wax and do not contribute to disease. Flores et al. (2005b) resolved this topic by chilling susceptible brood within wax combs built on contaminated foundation (using treatments of spores from one mummy and spores from 10 mummies) versus uncontaminated foundation. Significantly higher levels of chalkbrood were found in brood exposed to the higher dosage, thus they demonstrated that foundation wax contaminated with spores of *A. apis* may be a source of the disease.

Chalkbrood disease is typically most prevalent during the Spring, given that fungal growth is enhanced in cool and humid (poorly ventilated) beehives (Mehr et al. 1976, Gilliam et al. 1978, Puerta et al. 1994, Flores et al. 1996). In addition to environmental conditions, interactions between biotic factors such as differences in fungal strains and the genetic background of the bees may affect the incidence and severity of the disease (Aronstein and Murray 2010). Various strains of *A. apis* showed up to a 20-fold difference

Chalkbrood mummies on a landing board, being removed by hygienic worker bees.

in the level of virulence. A high concentration of fungal spores in the colony substantially increases chances of infection (Koenig et al. 1987, Gilliam et al. 1988, Flores et al. 2005 a,b), so the rate of disease incidence is likely dependent on a particular fungal strain's level of ascospore production, the rate of spore germination, and the efficiency of spore dispersal (Aronstein and Murray 2010).

Jensen et al. (2009) investigated chalkbrood susceptibility of in vitro reared honey bee larvae. Larvae were grafted from colonies headed by pure mated queens of *Apis mellifera carnica*, *A. m. ligustica* and *A.m. mellifera*, respectively. Three day old larvae were fed with different dosages of *A. apis* spores and a clear dose-response relationship was shown. Over the whole experiment LD_{50} estimates ranged from 55 to 905 spores. The response differed significantly (up to a factor of ten) between colonies of the same subspecies. The mean time to death decreased with increased dose, with more larvae dying faster after eating more fungal spores. The *A.m. ligustica* larvae tested were less susceptible to *A. apis* than *A.m. mellifera* and *A.m. carnica* larvae. BC

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Managed Pollinator CAP
Coordinated Agricultural Project

Honey Bee Genetic Diversity & Breeding

Steve **Sheppard**

Towards The Reintroduction of European Germplasm

One of the objectives of the Managed Pollinator CAP is to better understand the honey bee genetic resources available in the United States. A number of cooperating University and USDA laboratories in this Coordinated Agricultural Project and partners in the bee breeding industry are involved in breeding efforts to increase tolerance to *Varroa* mites, resistance to diseases and to otherwise improve apicultural characteristics in our managed honey bee populations. Fundamental to all breeding programs in agricultural animal and plant systems is the requirement that the population of interest contains adequate genetic diversity from which to make progress toward the "selection" of various desired traits. Simply put, "genetic diversity" is the raw material for breeding.

The original distribution of the honey bee included Europe, Africa and parts of Asia, where as many as 28 distinct "subspecies" or geographic races are known to occur. Records indicate that, with the assistance of sailing ships, North America beekeepers established a population of one of these subspecies (*A. mellifera mellifera*) in Virginia by 1622. The subsequent history of beekeeper-assisted honey bee transport to North America is a fascinating topic in its own right, with most additional introductions taking place between 1859 and 1922. By 1922, when further importations were restricted by the U.S. Honey Bee Act, seven additional subspecies had been sampled and introduced to the U.S., including three that found eventual favor with U.S. beekeepers: *A. m ligustica* (Italians), *A. m. carnica* (Carniolans) and *A. m. caucasica* (Caucasians) (Sheppard 1989a, b).

As a by-product of these various introductions, a large population of feral honey bees became established in the U.S. Genetic studies demonstrated that this feral population contained genetic markers indicative of various honey bee subspecies that constituted historical founding populations (Schiff and Sheppard 1995, 1996), thus providing evidence that the feral population could serve as a genetic reserve for bee breeders. Unfortunately, the arrival and establishment of parasitic mites in the late 1980s eliminated much of the feral honey bee population and consequently, this potential source of usable germplasm for breeding. There is recent evidence that remnants of the U.S. feral population may yet persist (Magnus and Szlansky 2005; Seeley 2007), which could restore the utility of this population to bee breeding. A further challenge to the maintenance of a broad genetic foundation for breeding results from current large-scale queen production practices, whereby each queen "mother" is typically used to produce more than a thousand daughter queens. Overall, it has been estimated that fewer than 500 queen mothers are used to produce around 900,000 daughter queens annually for commercial sale in the U.S. (Delaney et al. 2009).

One approach to provide additional genetic variability to the breeding process is to import additional genetic variation or even intact honey bee stocks from Old World sources. In recent years, one example of the latter has been the importation, screening, propagation and release of Russian Honey Bees by the USDA-ARS and industry partners. The idea behind the importation of this novel honey bee stock from far-eastern Russia, was that these bees had a long history of contact with *Varroa destructor* mites in a cold climate in Asia that could have contributed to selection for a measure of tolerance to both *Varroa destructor* and tracheal mites. Studies have supported this hypothesis, with Russian Honey Bees and their hybrids showing lower population growth of these pests, in side-by-side comparisons with some domestic strains (DeGuzman et al. 2007; Tarpy et al. 2007). These honey bees are currently available from queen producer members of the Russian Bee Breeding Association.

Another approach to provide germplasm for U.S. honey bee breeding is to make additional importations of genetic material from subspecies that previously found favor with U.S. beekeepers and use this material to "supplement" current genetic stocks of honey bees. Given the expense, regulatory and logistical difficulties that accompany the effort to import novel strains of adult honey bees, we undertook a limited approach to import only honey bee semen for instrumental insemination of U.S. queens derived from existing managed stocks. The story of these initial semen importations and the vision for future releases to assist U.S. bee breeding efforts form the basis for the remainder of this article.

The initial challenge prior to importation of aliquots of honey bee semen into the United States was to establish a means to safely contain imported material until final release could be granted by the USDA-APHIS (United States Department of Agriculture - Animal, Plant Health Inspection Service). To that end, isolated quarantine sites were established at Bald Butte and Smoot Hill in the

wheat growing Palouse region of eastern Washington (Figure 1). Both of these facilities encompass several hundred hectares of land, with lockable access, each surrounded by thousands of additional hectares of wheat, lentils, barley and other non-forage crops for honey bees. As a result, the chances of interaction with other honey bee colonies were minimized. As part of the protocol for importation, subsamples of all semen collected and (in some cases) daughter progeny from instrumentally inseminated queens were submitted to Dr. Judy Chen (USDA-ARS, Beltsville) for virus analysis, with results being transmitted to USDA-APHIS. The inseminated clipped-wing queens were maintained in nucleus colonies under quarantine until final release, on a case by case basis, by USDA-APHIS. By some measures, this approach may seem to be "overkill" to prevent the hitchhiking of pathogens, especially given that hundreds of thousands of Australian packages were imported into the U.S. in recent years with no testing. However, the current protocol and permitting system provides a verifiable mechanism suitable for future importations of honey bee genetic material for breeding.

The Old World honey bee subspecies named in the USDA-APHIS permit to WSU to support U.S. queen breeding efforts are limited to *A. m. ligustica*, *A. m. carnica* and *A. m. caucasica*. These three subspecies were all previously introduced into the U.S. and their descendants were commercially relevant honey bee strains for over a century.

A. m. ligustica – This honey bee subspecies was initially introduced into the U.S. in 1859 and forms the genetic basis for the popular "Italian" honey bee strain used by most U.S. commercial beekeepers. The bees are generally gentle and respond to a honey flow or feeding by rapid expansion of the brood nest and adult bee population. In 2008 and 2009, we obtained semen from a number of locations in southern, eastern and central Italy with the assistance of Professor Rafaelle Monaco from the University of Bari (Figure 2). The semen was transported back to the U.S. and used to inseminate a number of virgin U.S. queens (2008) and F1 queens (50% U.S. "Italian": 50% *A. m. ligustica*) (2009). In 2010, we obtained semen from *A. m. ligustica* drones near Bologna and upon transport back to the U.S., used it to inseminate F2 queens (75% *A. m. ligustica*: 25% U.S. "Italian"). Sue Cobey conducted the instrumental inseminations and a number of U.S. queen producers provided the virgin queens (see Acknowledgements). Germplasm from these importations was made available to cooperating queen producers.

Nucleus colonies at WSU's Smoot Hill Apiary on the 800-acre Hudson Ecological Reserve.

A. m. carnica – The homeland of this honey bee subspecies is the European Alps and, worldwide, Carniolan honey bees are one of the most popular strains maintained by beekeepers. The subspecies was initially introduced into the U.S. in 1877, where it gained a reputation for gentleness and good overwintering characteristics. In the U.S., one of the most successful efforts to promote the Carniolan strain has been the selected strain of "New World Carniolan" honey bees maintained by Sue Cobey and a supporting group of commercial queen producers in California. In 2008 and 2009, fresh honey bee semen from *A. m carnica* was obtained from the Institut fur Bienenkunde in Kirchchain, Germany. The semen was transported to the U.S. and used to inseminate virgin U.S. "Carniolan" queens (2008) and F1 queens (50% U.S. "Carniolan": 50% *A. m. carnica*) (2009). In 2011, Sue Cobey and Brandon Hopkins travelled to the Slovenian Alps and collected additional *A. m. carnica* semen (Figure 3). Some of this semen was frozen (cryopreserved) for later use and some aliquots were returned to the U.S. in the fresh state and used to inseminate F2 queens (75% *A. m. carnica*: 25% U.S. "Carniolan"). This genetic material was incorporated into the New World Carniolan program and is currently available through collaborating queen producers.

A. m. caucasica – This honey bee subspecies is endemic to the Caucasus Mountains and was initially introduced into the U.S. in 1882. It has general characteristics similar to the Carniolan honey bee, including gentleness and excellent overwintering characteristics. Historically, it was also noted for a propensity to collect copious amounts of propolis. While once available as

Professor Raffaele Monaco in an apiary in south central Italy that served as a source for the collection of A.m. ligustica *semen in 2009.*

a commercial "strain" in the this country, the Caucasian honey bee is no longer readily widely available, so our breeding efforts included retrieval of this genetic material and propagation via a Carniolan genetic background. The initial collection of *A. m. caucasica* semen took place in 2010 from locations in the Republic of Georgia, with the assistance of Mr. Eric Olson (a commercial beekeeper from Washington State) who had local family ties in Tblisi, Georgia, Dr. Ivane Nicoladze and Shalva Ioseliani, a Georgian queen producer (Figure 4). In 2011, the collecting trip was repeated, with the addition of a cryopreservation component for portions of the semen collection (Figure 5). In 2010, the collected semen was used to inseminate U.S. "Carniolan" virgins and in 2011, the collected semen was used to inseminate F1 daughters of these initial crosses (50% U.S. "Carniolan" and 50% *A. m. caucasica*). This genetic material is currently being evaluated in the WSU honey bee breeding program and will be made available through collaborating queen producers.

Cryopreservation

Traditionally, honey bee semen used for instrumental insemination in breeding and experimental protocols has been used "fresh." That is, as collected semen loses about 50% viability per week under normal "room temperature" storage conditions, the allowable window for making use of collected semen is generally around two weeks. In most of our semen importation efforts, one week was allocated for the actual collecting trip and the semen was used to inseminate waiting virgin queens back in the U.S. during the second week. This presented a limitation on the importation process that was recently removed with the development of a viable means to cryopreserve honey bee semen and subsequently create multiple generations of queens from frozen semen in a short time (Hopkins and Herr 2010; Hopkins et al - *In Press*). Starting in 2011, subsamples of all semen collections were cryopreserved and placed in storage in liquid nitrogen for future use as part of a honey bee germplasm repository.

Honey Bee Breeding

There are many challenges to maintaining honey bee colony health within the modern agricultural system of the United States. Many of these challenges derive from the demand for the efficient and timely pollination of large monoculture crops, including the need for extensive highway transportation of beehives, the requirement that colonies (in almonds) be stimulated to be in a physiological state conducive to pollination activity several months earlier than their "normal" annual cycle might dictate, overall limited nutritional opportunities due to placement on single crops and an ever present stress due to pesticide exposure both in the hive and field environment. Researchers participating in the Managed Pollinator CAP continue to evaluate such factors affecting colony health in many parts of the country. As a result, there is a growing body of evidence from these and other laboratories that demonstrate the potential and realized negative consequences of specific parasites, pathogens, nutritional stresses and pesticides, both singly and in combination. All of these potentially interacting factors impinge on a U.S. honey bee population that has a genetic background reflecting both historical and beekeeper-selected processes.

Research has shown that the maintenance of genetic diversity at the colony level can be an important contributor to colony health (Tarpy, 2003; Tarpy and Seeley, 2006). The addition of genetic diversity at the population level can increase the prospect that genetic material will be available for the subsequent selection of traits useful to apiculture. However, it will take a concerted effort by bee breeders, queen producers and researchers involved in selection programs to improve the genetic stocks of honey bees available in the U.S.

As we reflect that the western honey bee *Apis mellifera* thrives in some regions of the world with minimal or no chemical treatments for mites and diseases, it seems reasonable to expect that we could make significant and sustainable improvements to our own managed pollinator population by more fully utilizing the resources of the honey bee genome.

Acknowledgements

Funding for this work was provided by the USDA Managed Pollinator CAP, grants from the State Beekeeping Associations of Washington, Oregon, California and Oregon, from the California Almond Board, the National Honey Board, the Foundation

Collecting A.m. carnica *semen for importation. Left to right Sue Cobey, Stane Plut and Ales Gregorc.*

A.m. caucasica *apiary high in the Caucasus Mountains near Mestia, Georgia. Note the medieval "Svanetian Towers" used as defensive structures int he 9th through the 12th centuries. Caucasian queen producer Shalva Ioseliani is in foreground.*

for the Preservation of Honey Bees and from Project ApisM. Overseas field work was made possible by contributions of time and bees from numerous beekeepers and other individuals, including: R. Buchler, S. Cobey, C. Costa, E. Frost, A. Gregorc, B. Hopkins, S. Ioseliani, R. Kalashyan, M. Meixner, R. Monaco, E. Olson, I. Nicoladze. S. Cobey conducted instrumental insemination. Virgin queens for instrumental insemination were provided by S. Cobey and U.S. queen producers: Tom and Suki Glenn, Pat Heikem, Koehnen and Sons, Inc., Jackie Park, Valerie Severson, Pat and Bonnie Stayer and Glenda and Shannon Wooten. U.S. field work, apiary and stock maintenance relied on oversight from Beth Kahkonen and Elizabeth Frost. Additional field assistance was provided by N. Boyle, M. Taylor, J. Vierya, and B. Hopkins. BC

WSU student Brandon Hopkins transfers recently cryopreserved honey bee semen from a programmable temperature module into liquid nitrogen for long term storage in a Tblisi, Georgia hotel room.

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Some Thoughts On
IMPROVING GENETIC DIVERSITY

Roy **Hendrickson**

The Best Means Of Achieving A True, Long Term Solution To Genetic Improvement Is Through Small Scale Beekeeper Participation At The Local Level.

I'm constantly reminded of the frailties involved in keeping bees, particularly as regards startup and small scale operators. I just concluded a conversation with a longtime beekeeping friend and neighbor who was lamenting the current state of her small apiary. Having lost all her colonies last winter, my friend installed three packages in late April. The packages built up well and produced a modest surplus, along with a small swarm, off the Spring and early Summer honey flows. When the surplus was removed, a partially filled super was left above the excluders to help tide the colonies through the mid Summer dearth period. Any Fall honey would be left for overwintering purposes. Unknowingly, the packages my friend purchased through a regional distributor were all headed by overly prolific Italian queens. Therein lies her current problem and the gist of our conversation. Not only did the colonies fail to produce any Winter stores, by early November they were virtually on starvation's doorstep, full of bees and brood, with the onset of winter just around the corner. My friend's situation is by no means unique. In all probability, many thousands of other package buyers have similarly purchased stock that is of little or no value in their operating territory. This general scenario is undoubtedly one of the main reasons for the massive turnover among startup beekeepers.

The beekeepers greatest peril is of course *Varroa* and its host of related maladies. *Varroa* along with the inappropriate stock illustration described above share a common denominator. Their only realistic long term solutions rest with improved stock. Unfortunately very few beekeepers have the capacity to develop and maintain a comprehensive stock selection program. Nearly all lack one or more of the following – adequate time, breeding expertise, the necessary number of colonies for selection and testing purposes, and lack of mating control. Nor is quality stock routinely available through the traditional queen replacement channels. Were that the case, many of today's critical management issues, including those depicted above, would be relegated to ancient history. If small holders are to survive and prosper they need simple, economical, and effective methods of upgrading their stock; methods that will enable them to take full advantage of local or regional stock improvements.

JZ BZ base mount cell cups, three styles of grafting tools.

Current Methods

Historically the primary modes of genetic transfer have been through the sale and distribution of breeder and production queens. Breeder queens are the end product of the bee breeder's stock development work. They represent years of selection and testing for a variety of specific characteristics deemed to be of importance. Generally speaking, these queens have been instrumentally inseminated, although it's quite possible to produce open mated breeder queens under the right circumstances. Because of the time and effort spent in developing the genetic base these queens represent, breeder queens tend to be rather expensive with costs often running into the hundreds of dollars. A little pricey for the average backyard or small sideline operator. Production queens are the queens you routinely purchase with packages, for increase or normal queen replacement purposes. Ideally, these queens are the daughters of a specific breeder with a known genetic background or history. Unfortunately, it's equally possible they are the daughters of queens whose parentage has been long lost to posterity.

When you're in the market for production queens, it's wise to keep the old adage "Buyer Beware" in mind. There is a third type of queen out there, one you will never see advertised in any magazine. I refer to these as Accidental queens. Those of you who have kept a number of colonies in multiple yards over a long period of time know exactly of what I speak. Accidental queens come about courtesy of Mother Nature. They are the result of random mating; whose progeny exhibit specific, often unique characteristics. Accidental queens are one of the real joys of beekeeping, plus they provide a great opportunity for genetic improvement at the local level.

Five frame nuc box, used for both transport and queen rearing.

Replacement queens are one of the most basic beekeeping essentials. Without a reliable supply of replacement queens most beekeepers would find it impossible to maintain their colonies for any length of time. Traditionally, when the need for replacement queens arises, the general procedure is to dial up the queen producer, place the order, arrange payment, then sit back and wait for delivery. All the responsibility for queen production and timely delivery rests with the producer. Multiply this scenario by the total number of participating beekeepers, and you end up with many thousands of orders, requiring hundreds of thousands of queens, a rather large number by any standard. Here's the critical question. How many different queen producers are out there supplying all these queens – 50, 75, perhaps 100 at most? Finally, how does a queen producer in one of the southeastern states, California or Hawaii, supply you with queens that are genetically acclimated to your operating territory?

When you reduce the issue of stock or genetic improvement to its most basic form, there are two separate, but related issues that need to be addressed. One, it's obvious the replacement queen industry is unable to shoulder the burden of genetic distribution alone.

Pollen substitute cake in place on a five-frame queen rearing colony.

The only alternative means of achieving a true long term solution is through small beekeeper participation at the local level. Secondly, to facilitate that end, the current methods of genetic transfer or distribution need upgrading.

Alternative Methods

The alternative ideas that I present here are not new. They have appeared in the common bee press as recently as 2008. My main objective is to clarify and hopefully promote their basic concepts. Realize it or not, the primary responsibility for stock or genetic distribution rests squarely on the shoulders of the individual beekeeper, you! Put another way, if you want highly productive colonies that require a minimum of management and treatment inputs, it's your responsibility to acquire and install the appropriate genetic material. Sounds complicated, it's really not! Well established bee breeding programs already exist, and breeders want to distribute their stocks. However, they are not in a position to supply mated queens to all the requesting parties.

Unfortunately, feu capacity to deve comprehensive stock can be done. H

That's where the everyday beekeeper enters into the fray. Working individually, in small groups, or through a club or organization, genetic material is acquired from a breeder or local supply source in the form of 12 to 24 hour old grafted larvae. Ideally, the grafting work is done by the recipient; otherwise someone on the supply end provides the service. Either way the cell bars containing the newly grafted larvae are transported to the beekeepers home location where they are immediately placed into pre-established rearing colonies. From this point on, traditional queen rearing and mating practices are employed. Here's how this works.

Transport

Safely transporting the grafted cells is of paramount importance. For short and medium distance travel situations simply wrap the cell bars in wet cloth towels to prevent larval dry out. Long distance travel situations or transport in warm or extremely dry climates mandates additional protection. An additional layer of protection might be afforded by priming the cell cup with extra royal jelly preparatory

to grafting. I would also suggest placing the wrapped cell bars in some form of insulated box. To maintain adequate humidity, include a small pan of water and a sponge. These methods should work well in situations where the transport distance doesn't exceed five or six hours. For those individuals traveling extremely long distances, or those requiring large numbers of larvae, there is a second transport option that should eliminate most of the travel issues. Instead of moving grafted larvae, transport frames of eggs and very young larvae via the use of a nuc box or single hive body colony. At the breeder's location pre-selected frames of eggs and young larvae, from one or more genetic lines, are transferred into the customer's equipment for the return trip. Once home, the beekeeper should have a two or three day window in which to complete the grafting operation.

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Payment

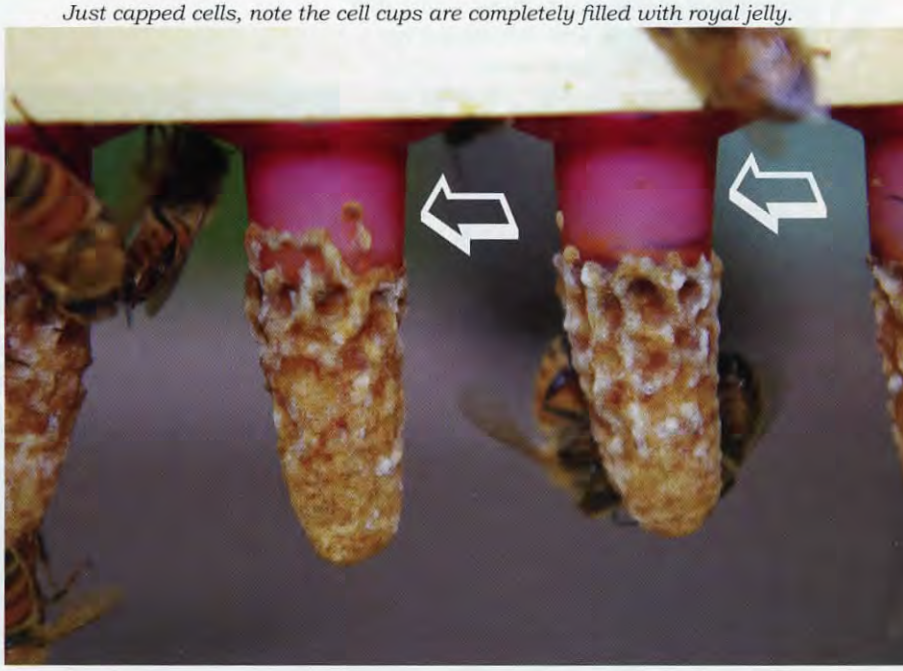
This topic will without doubt create the most debate. How much are these services worth? I've seen the benefits this form of genetic transfer has to offer. Consequently, my personal views on the subject may appear somewhat liberal. In the grafted larvae example cited above, the recipient or customer literally can't lose. Whatever his or her cost, the addition of superior stock to the apiary should offset that cost in relatively short order. In most circumstances, the actual out of pocket expenses will be far less than the cost of buying and maintaining one or more breeder queens. In those instances where a bee club or a group of beekeepers has banded together, the costs are so spread out that they are inconsequential. The opposite side of the coin reads slightly different. The queen breeder has a well defined list of development and production expenses that have been spread out over a considerable period of time. The sale of grafted larvae, or frames of eggs and young larvae, is genetically the equivalent of a breeder queen. Therefore, it's only reasonable that the breeder be remunerated at a rate commensurate to the value of their breeder queens. From that perspective, I think that grafted larvae from top line breeder queens should fetch *at least* two dollars apiece. For small orders of 25 cells or less, two larvae for five bucks would seem fair. Frames of eggs and young larvae are more difficult to price. Obviously the amounts and age of the eggs and larvae are prime considerations. Extensive travel time might also have to be taken into account. It's just a guesstimate, but I would think that a deep frame half to two thirds filled with eggs and some young larvae should be worth a minimum of $150 to $200. For truly top quality stock, I would feel that I was stealing the frame at that that price! These are my general thoughts on the subject. Everything is arbitrary, so if you disagree, work out your own arrangement.

Frame of finished cells.

Queen Rearing Basics

Most small beekeepers are hesitant to attempt queen rearing due to their perceived inability to graft. The methods described above should eliminate that obstacle; hence queen rearing becomes just another series of colony manipulations. For the small operator requiring only a limited number of cells, I recommend a five

Just capped cells, note the cell cups are completely filled with royal jelly.



Planted cell, the queen will emerge within 24 hours.

frame queenless/broodless nuc for the rearing colony. This unit requires a minimum of startup resources and very little manipulation. In addition, the absence of open brood eliminates the possibility of rogue queens destroying the finished cells just prior to emergence.

The basic colony setup procedure is as follows. The center frame space which will eventually house the cell bar containing the grafted larvae is temporarily left open. On one side of the open space place a frame mostly filled with nectar or uncapped honey. Opposite that add a frame partially filled with nectar and recently collected pollen. The two outside frames should contain some empty comb to catch any incoming nectar. The last step in the setup process involves placing a frame containing a small amount of eggs and young larvae into the center open space. There are three very specific reasons for this manipulation. First of all, the worker bees in this type of queenless /broodless colony are very prone to drift into neighboring colonies. By placing that small amount of brood in the colony the drifting potential is largely eliminated. Secondly, the young larvae offer a foolproof means of determining whether or not the rearing colony is truly queenless. When the brood frame is removed in 24 hours, the prescence of emergency queen cells around the edges of the open brood indicates the colony is indeed queenless. The absence of queen cells would indicate that a queen from the donor colony was accidentally shaken in along with the nurse bees. Last and most important, being queenless the rearing colony immediately initiates cell production. The nurse bee's brood food glands begin producing royal jelly in order to feed the emergency queen larvae. When you substitute the grafted cells 24 hours later royal jelly production is already well underway. This little substitution trick is one of the main reasons why these small colonies produce such nice queen cells.

The final step is to add the nurse bees that will actually rear the queens. This procedure involves shaking young nurse bees off combs of open brood from one, probably several established colonies. Based on 1980s research, we know that it takes approximately 400 nurse bees to rear a queen. Therefore, the strength of the rearing colony can vary depending on the number of grafted cells. For example: let's assume that your cell bar contains 10 cells. Using the 400 nurse bees per cell ratio, you will need to shake approximately 4000 bees into your rearing colony. Add 25% to cover any margin of error and the number increases to 5000. Assuming that there are between 3500 and 4000 bees per pound, you need about 1¼ pounds of bees or approximately half the number of bees in a three pound package. That translates into approximately three frames of bees when they are shaken off frames of mostly open brood. Again, play it safe and shake in a fourth frame.

Once the nurse bees have been added, the colony is moved to prevent drifting. In approximately 24 hours the unit will be ready to accept the grafted cells. At that time simply remove the frame containing the young larvae and check for any emergency queen cells on other frames. Absent any cells all the remaining frames shake or brush the nurse bees back into the colony and install the cell bar. If the beginnings of emergency queen cells are not present, there is a queen in the colony. Once the queen is removed the cell bar can be installed in the normal fashion. The finished cells should be ready for removal to the queen mating nucs approximately 10 days after the grafting date. BC

Roy Hendrickson is a sideliner who lives in Chardon, Ohio and contributes frequently to these pages.

Rossman Apiaries

Jennifer **Berry**

You've probably met Fred and Ann at a beekeeper meeting. There's a lot of history, and great people standing behind that table.

The U.S. beekeeping community is relatively small when you look at the numbers. Roughly there are 1200 full-time commercial operations, 5000 part-time sideliners and between 120,000 and 150,000 backyard beekeepers. If you read the journals, magazines, newsletters or attend meetings you are bound to become familiar with certain names, especially those that have been in the business for sometime now. One of those names is Rossman Apiaries located in Moultrie, Georgia. Fred Rossman, owner and operator of Rossman Apiaries, is well known and respected by beekeepers from coast-to-coast for his ability to provide quality bees and beekeeping equipment, but there's a lot more to him than that. Fred is one of those rare souls whom, when you meet him, you instantly feel at ease because he tells it like it is, and, when he says he's going to do something, you can bank on it.

But, Fred's also known for reinvesting in both his community and the beekeeping industry through public speaking, education, and his various leadership roles. He's been Director of the American Bee Breeders Association, a Board Member for several terms for the American Beekeeping Federation. Locally, he has served as President for the Civic Club, and Board of Deacons and Elders for the First Presbyterian Church. He has also served several terms as President and Board Member for the Georgia Beekeepers Association who, by the way, recently recognized Fred with their highest award: Georgia "Beekeeper of the Year" for 2011. Recently, I was fortunate enough to have a private audience with Fred and queried him about his life and business. Fred is a quiet fellow and is somewhat reluctant to talk about

Fred Rossman and his good friend.

Ann Rossman.

himself. But, he was generous with his time and energy, and eventually shared a good bit of history about Rossman Apiaries, his family and his philosophy that I believe beekeepers would enjoy hearing (reading) as much as I did! Let's start from the beginning.

Fred's Father, Joseph "Joe" Grey Rossman, oldest of nine children, grew up on a dairy farm. Each day he milked the cows, fed the cows, cleaned up after the cows, and delivered milk from the cows. So, by the time he was a young man, he was pretty much done with the cows. Across the street, there lived a beekeeper that roused Joe's interest. From time to time, Joe would wonder over to learn the nuts and bolts of his trade. Over the years, this routine slowly carved a path, which led him to a new career. One day in 1934, Joe left the dairy farm to work for the Puetts in Hahira, Georgia, who were the largest queen and package producers in the state. The small town of Hahira was eventually known as the "Queen Bee Capital of the World." Joe worked there for several years until he met a beekeeper from St. Paris, Ohio, E. W. Long (short for Emerson W.).

Like most large, Northern operations, E.W. would transport his colonies down South, specifically Georgia, during the Winter months. Then, in the Spring, he would make splits and haul them back North to sell. Joe and E. W. joined forces in 1936 and started a partnership called Rossman & Long. E.W. concentrated on the northern end of things while Joe worked the southern. They sold bees, queens, and nucs. They remained business partners for 14 years and parted as friends when Joe formed Rossman Apiaries in 1952. Joe continued producing queens, packages and nucs, and occasionally delved into honey production, albeit only as an afterthought when there were surplus quantities.

During our conversation about the history of Rossman's Apiaries, Fred reminisced for a moment about a trip that he and his father took to North Georgia to deliver honey, which was a particularly long journey from South Georgia in the 1950s. Once they arrived at the Tallulah Gorge, a two mile long and 1,000 foot deep Southern Appalachian canyon, Fred and his father parked the truck, and walked to the center of the bridge spanning the gorge. Joe took out one of those big-headed, wooden match sticks, told his son to watch this, and dropped it over the side. Fred said, "No joke; just before that match hit the bottom of the canyon, it lit."

Queen Cell Production.

Fred and his siblings worked for the family business as they grew up. Hence, when Fred graduated from high school, he already knew exactly what he wanted to do for the rest of his life. Actually, he had always known. Though, there was an opportunity to go to college and, through the persuasion of his parents, he begrudgingly pursued it. By the time his junior year at Auburn University came around, he had had enough of college. He drove home to tell his folks. His mother looked at him and said, "You need to finish." His Father, a man of few words, said, "Do what you want to, but I'd like to see you finish." On the way back to school, Fred made a decision, to not quit. In 1966, he graduated from college with a degree in business. Finally, he was ready to do what he knew was in his heart. Oh, he had several business opportunities, and inquiries from petroleum and manufacturing companies, but he didn't even take the first interview. He packed his bags because he knew where he belonged: Rossman Apiaries in Moultrie Georgia. And he has never regretted his decision, not for even one second.

When Fred arrived home from college he was ready to go to work. He quickly established himself as the field man. Fred liked having his hands full, of bees, that is. He tended the colonies, ran the crews, shook packages, drove the trucks, caged queens, fed bees and anything else that needed doing. His younger brother, Philip, also came to work for the family business after completing a degree in Agricultural Administration. Philip worked almost 20 years until Multiple Sclerosis finally forced him to take medical disability in 1987. Fred still raves about how Philip was great at queen rearing and

Rossman nuc yard.

Rossman packages ready to be shipped.

the business end of things, especially public relations.

When Fred joined his father, the bee business was booming. While keeping bees has never been without effort, it was certainly a heck of a lot easier then than it is today. Borders were open and package bee exportations were off the chart. There were no varroa mites (and their associated viruses), no tracheal mites, no small hive beetles, no Africanized bees, no chalkbrood, and no European Foulbrood.

From 1960 through the mid-1980s, Rossman's sold 15,000 to 16,000 packages per year, mostly to Canada. Semi-trucks would drive down from Canada, pick up 2,300 packages at a time and haul them back north. The most notable difference between then and now was that two-pound packages were the staple, not the three-pound ones that we're familiar with today. Northern customers preferred the two-pounders because, at less cost, they could build up just as fast as a three-pounder as long as they were installed by the first part of April. Fred reminded me that during those "golden years," the bees had more forage, less disease, and no mites to contend with. During that time over 90% of Rossman's package orders went to Canada; this, however, was all about to change.

Feeding cans.

March 12th, 1986 was a bad day for the queen and package producers in the southeast, especially for the Rossman's. Fred said that he will never forget when he heard the news that the Canadian government closed the eastern border to southern U.S. bee imports in a desperate, yet unsuccessful, effort to stop the onslaught of tracheal mite infestation. "There had been reports but I never expected the shut down to occur at the beginning of the season" he said. One day the boarders were open, the next day closed. A regular Canadian customer of Rossman's had a truck en route to Moultrie at the time, expecting to pick up a load of packages, but, as soon as the news hit, they were diverted to California, which had not yet been included in the ban.

Within a short spell of the border shutdown, Rossman Apiaries' was on the verge of bankruptcy! Fred was trying desperately to keep the business running. He auctioned off land, cows, and anything he could to keep the doors open. He had to cut the work force down to a bare minimum because there wasn't any orders, hence any business. And, to make matters worse, other bee producers, who were in the same boat, were now all competing for the U.S. market. There were too many producers with too many bees and too few customers. Unfortunately, several businesses didn't survive. Others turned to honey production and got out of the package business completely. Just a handful of the producers who experienced those hard times are left in Georgia.

Fortunately for Fred and his family, it didn't take too long for the clouds to part and the sun to shine. Fred was offered an opportunity to buy Forbes and Johnston, a cypress bee supply company in Homerville, Georgia. He figured that, while the bee package business recovered, Rossman Apiaries could diversify into selling beekeeping supplies. While it didn't solve everything overnight, it definitely helped to turn the corner during a difficult time. They also began accepting pollination contracts, but eventually ceased doing so for two reasons: one, Fred hates to move bees, and, two, you can't do everything!

Fred told me that nothing makes him more tense than hauling around a truckload of bees (which I agree!). When everything works out, it's no big deal: you leave at 3 or 4 a.m., arrive at the location before sunup, unload the bees, and, presto, you have instant pollinators! But, unfortunately, it doesn't always work that way. Here in the south, and elsewhere where temperatures are too warm to keep colonies closed up during a move, a decision has to be made either to cover the colonies with large nets or not; Fred always opted for the latter. Only problem being, a truck breaks down in the middle of the night, and there's nobody willing or able to help you until late the next morning. Meanwhile, the truck is in the sun, and by first light little bee bodies start appearing at the entrances and taking flight. Then by the time the repair guy shows up and sees this enormous, black cloud of bees flying around, he quickly makes an about face, gets back in his truck, and speeds away . . . , which is not a good start to your day.

The second reason they stopped moving bees around was Fred realized that something had to go. "Too many irons in the fire!" he said. "We were running night and day: shaking bees, making deliveries, moving bees, taking orders, shipping out orders, caging queens, working in the shop, building equipment, and taking more orders." So, one day, he realized pollination would have to be someone else's job.

While talking with Fred, I asked, what are the biggest challenges you face running your business? After thinking about it for a minute or two, he said, "Well, Jennifer, I really can't think of anything. I may have to get back to you on that one." Then he told me about how much he enjoys what he does. "So, sure there are stumbling blocks, but one can al-

ways find a way around them when you're happy with what you do," he said. We were chatting about other things when he stopped and added, "I wouldn't necessarily say this is a challenge, but what concerns me from year to year is promising something and then making sure I can fulfill that promise."

Every year even before the first package is shaken, Rossman Apiaries is sold out of packages. This is a good thing for business, but it makes Fred nervous every season. "You are walking on faith because you don't have a clue what is going to take place from now to then," Fred explained. One thing is for sure; Fred is very conscientious about trying not to overbook. He knows how many productive colonies are going into the winter and runs the percentages. Fortunately, in the past, there have been no major disasters. However, Fred does interject that their schedule is so tight that, once spring arrives, it only takes one day of rain, cold weather, the crew being sick, or the trucks breaking down for the entire year to be out of kilter. It's like a domino effect. Then, you realize that most of your packages were ordered five months ago. "The customers are relying on you to fulfill that promise," he continued, "If you can't satisfy the order, then, more than likely, the customers won't be able to find bees anywhere else because everyone has been sold out for months." Ouch!

Another concern of Fred's is making sure his customers are satisfied. "To be honest, it bothers me if I have sold someone something, and they aren't happy with it. But, sometimes customers won't or don't say anything. So, how are you supposed to know? I guess that, as long as you're honest with your customers, your goal is met," he said.

As stated, Fred definitely tries not to overload his plate. To avoid this, he relies heavily on his wife, Ann Rossman. "Scheduling the queen and package pickups are the most important aspect of this company," he noted, "So, I let someone more qualified than I handle it." Ann is not only in charge of the office, but she also attends most of the bee meetings and manages payroll. This is quite a lot to handle, but handle it she does! "She's the backbone of this company," Fred clarified. What is that saying . . . behind every great man, there's an even greater women? Well, Ann is that; you'll never meet a finer Southern lady.

The other kind of packages that get shipped from Rossman Apiaries.

When I visited Rossman Apiaries this Fall, Fred took me around and introduced me to his crew. They were in the wood shop sawing, cutting out equipment, and putting together orders in boxes of all sizes to be shipped. They were also coming in from the beeyards and in the office taking orders. It is quite the operation, and they have a great crew. "You're only as good as the people you hire," Fred continued, "A lot of people over the decades have worked very hard making this business successful."

If you've ever met Fred, probably while manning his booth at a bee meeting, then you know what a solid man he is. Things could be going crazy all around him and he would just smile, shrug his shoulders and get to work. He told me once that worrying about something doesn't do a bit of good. He said, "Yes, you need to be concerned when it matters, but sitting around worrying about something is a waste of time." He then quoted one of his favorite life mottos, "Worrying is like a rocking chair; it gives you plenty of work to do, but it will never get you anywhere." Amen!

Today, Rossman Apiaries sell from 9,000 to 10,000 honey bee packages, as well as 10,000 queens, per year. The wooden ware they build is made out of cypress. Since the acquisition of Forbes & Johnston, Fred has continued to work with cypress because it's a better wood for bee hives. It's insect resistant, hardy, and easy to work with.

Ann and Fred have three children: Amanda, Scott and David. Amanda's husband Clint works for Fred. Their two boys are entrenched in jobs outside of beekeeping: banking and construction. Fred doubts they'll ever come home to Moultrie to carry on the business, which is fine. He also jokes from time to time about selling his business. I hope this never happens, at least while I'm still a beekeeper. BC

Jennifer Berry is the research director at the University of Georgia Honey Bee Research Lab.

NORTHEAST HONEY PLANTS

Ross **Conrad**


Dandelion

While there are many differences between the states that occupy the Northeastern corner of the United States, when it comes to honey production they all share a similar reliance upon just a few species of honey plants. These plants taken together tend to be responsible for the bulk of each year's honey crop in most commercial and backyard apiaries. Although the weather plays a huge role in determining when and if these plants will produce copious amount of nectar, by paying attention to the time when these important nectar sources flower, beekeepers can coordinate their hive manipulations and management activities so that their colonies are able to capitalize on these primary nectar flows when they materialize.

From Pennsylvania and New Jersey up through Maine, the first major flow of the year occurs in spring when that bane of suburban landscapers and lawn lovers begins to bloom: the dandelion (*Taraxicum officinale*). This perennial, herbaceous plant with long lance-shaped leaves, fairly deep roots, and cheerful yellow blossoms appears here and there in spotty locations at first, but can quickly fill out entire fields with a blanket of yellow. In some years, the dandelion honey flow is so strong that in some areas hives can fill not only their brood chambers but a shallow super as well, before the blooms start to fade.

Dandelion yields a deep yellow honey that has a strong flavor and is usually quick to granulate but is highly favored by some honey aficionados. For the most part though, dandelion honey and its accompanying bright yellow pollen, is used by the bees to build up their population and create new comb in preparation for the next major nectar flow of the year from the clovers and Alfalfa (*Medicago sativa*), which begins late in the Spring and can last almost the entire Summer. Throughout most of the Northeast, Clover and Alfafa honey typically make up the majority of the crop that is harvested.

Clover does not do well in acid soil since the clover roots require a high pH to form their nitrogen fixing nodules. In the northeast the temperatures are conducive to clover growth since historically they don't get too high, and there is usually enough rainfall to prevent nectar secretions from becoming unreliable. While the clovers don't always produce a bountiful crop, as this past year clearly illustrates, they can usually be counted on for something and rarely fail to produce altogether.

While in previous eras sweet clover, both white and yellow, were the primary nectar sources from clover in many areas, these days White clover (*Trifolium repens*) and Alsike clover (*Trifolium hybridum*) predominate through most of New York, Pennsylvania, New Jersey, and the New England states. Of the two clovers, alsike is considered to be fully equal to white clover, and will even produce more honey and be more reliable as a honey plant. In his book, Honey Plants of North America, author John Lovell indicates that the name *hybridum* was given to alsike since it was originally assumed that it was a hybrid cross between white and red clover (*Trifolium pratense*). However, it is now considered a distinct species that originated in the parish of Alsike in Sweden, where it was first discovered.

Alsike is a very hardy perennial that will grow on land too wet for red clover and does better in soils containing less lime that White clover. The bloom period of alsike is also much longer than that of white clover, which can help beekeepers reduce the need to feed hives in Autumn. Although often slightly larger, the flowers of alsike are similar in structure to white clover and have a pinkish tint that covers part of the blossom making it easily recognizable.

White clover is widely considered as a premier honey plant and its honey regarded as one of the finest in the world. White clover is often the honey that other honeys are compared to. Its honey is so delicious and white that even when mixed with a fair amount of honey from other plants, it will retain the light color and flavorful appeal that pleases the expectations of most consumer's for a


Clover

high grade table honey. Like alsike, white clover does better in cooler weather and yields more nectar in the Northeast than it does in the Southern United States. Beekeepers will notice that the heaviest flows from clover will occur on hazy, hot, and humid days. According to John Lovell, the clovers will yield the heaviest when temperatures are between 80-90°F (27-32 Centigrade). White clover is propagated both by seed, and by runners that root from the nodes. Lovell says that white clover grown from seed will produce more nectar during its second season than in its first.

Alfalfa the other primary nectar source during the Summer months for bees in the northeast produces honey that can run water-white to amber-colored and has a heavy body that weighs 12-13 pounds per gallon. Most other honeys rarely weigh more than 12 pounds per gallon. Like clover, alfalfa likes fertile limed soil and yields nectar best at temperatures over 80°F.

A member of the legume family, alfalfa is a perennial, herbaceous plant. With trifoliate leaves, alfalfa superficially resembles clover however the leaves of the alfalfa plant are elongated and not as round and flat as those of white and alsike clover. Alfalfa has an exceptionally deep taproot that can delve to depths of over 15 feet making it resistant to drought.

When it blooms alfalfa produces violet purple flowers that have an irregular shape. The alfalfa blossom is rather unique in that the pollen-carrying keel petal of the flower is under tension like a spring and when released strikes pollinating bees squarely between the eyes. This helps to transfer pollen to the foraging bee enabling cross-pollination. After the keel of the blossom has been tripped, the flower will continue to secrete nectar and attract pollinators. Honey bees do not like repeatedly being struck in the head and quickly learn to bypass the spring-loaded mechanism of the flower by drawing nectar from the side of the blossom.

Alfalfa commonly has the highest nutritional value of all the hay crops and is grown throughout the northeast primarily by farmers who raise dairy cows. Like clover, alfalfa has the ability to increase nitrogen content in the soil so it also is used to increase soil fertility. Farmers like to cut and bale alfalfa at the bud state before it blooms, or just as the field is beginning to flower (about 10% of the plants in bloom) since this is when the plants contain the highest concentration of protein. However, due to rain or other factors, farmers often get behind on their haying and this is when bees can take advantage of the nectar bearing blossoms.

The final primary nectar source of the year for bees in the northeast is Goldenrod (*Solidago*). Goldenrod begins to bloom in mid-summer, although early goldenrod may bloom sooner and can continue to bloom as late as November, and some blooms last even into December as in the case of the salt marsh goldenrod. Of the more than 85 species of goldenrod only a few are found in South America and Europe, while most are found in North America. Of these, at least 50 types of goldenrod are found East of the Rocky Mountains and North of Tennessee.

The golden-yellow flowers of the goldenrods are quite small but are clustered into plumes that can contain more than 1500 blossoms and are extremely attractive to pollinators. Goldenrod nectar produces a very thick and heavy, deep-yellow or amber-colored honey. The honey


Goldenrod

has a rich full bodied taste and is fairly quick to crystallize. Both the nectar and pollen collected from goldenrod make good over-wintering provisions for honey bees and are often left on the hive by beekeepers to be used as such. While being processed into honey within the hive, goldenrod nectar gives off a heavy, musky scent that new beekeepers sometimes confuse with the smell of American Foul Brood disease.

While soil and climate influence nectar secretions, there is a lot of variability in nectar production between the various kinds of goldenrod. For example, Lovell notes that the bushy goldenrod (*S. graminifolia*) and the tall hairy goldenrod (*S. rugosa*) are the best honey sources of all the goldenrods in Maine, while the early goldenrod (*S. juncea*) and the field goldenrod (*S. nemoralis*) are not very attractive to bees.

There exist scattered localized areas through the northeast where notable, though often short honey flows will originate from other plants such as raspberries (*Rubus idaeus*), asters (*Aster*), and knotweed (*P. incarnatum*), as well as black locust (*Robinia Pseudo-Acacia*) and basswood (*Tilia americana*), a.k.a. Lime tree or American Linden trees. The trees in particular are known to be inconsistent honey producers and can only be counted on to produce honey in abundance once every few years or so. Mostly because of the weather.

It is estimated that, depending on the sugar concentration of the nectar, between one to two million blossom visits are required for a hive to make one pound of honey. Given that dandelions, white clover, alsike clover, alfalfa, and goldenrod are among the most prolific producers of nectar bearing blossoms in the northeast, it is easy to understand why these plants are responsible for the vast majority of the honey that bees produce each year. BC


Raspberry

Beekeeping Instructor's Guide

Life In The Bee Nest
Second In A Series

Larry **Connor**

Used with proper supervision and instruction, an observation hive is an excellent teaching tool. This couple stops to watch the bees at the Beekeeping Exhibit at the Alaska State Fair 2010.

Introduction

In this session (or series of sessions, as you are able) examine with your students the world inside the bee nest, with an overview of the work of the girl bees – the queen bee and the workers – and the boy bees, the drones. Look at the annual food cycle of the hive, and how that influences food gathering, comb building and food processing. Also look at the colony's reproductive cycle, a behavior called swarming, and how bees find and select a nest.

As you are able:

In the field look at pollen and nectar collection (food gathering) by honey bees. In the apiary look at the two sexes and two castes of females. Examine how the bees process their food and build comb.

In the laboratory, set up an observation hive, and give each student a set amount of time watching worker bees. Also allow each student time to watch the queen bee.

A. Textbook

Look at the queen, workers and drones and their relationship with each other. Introduce the annual cycle of the hive with emphasis on food gathering, swarming, nest finding, comb building, and food processing/storage.

What role food gathering plays in winter survival and dearth periods?

Members of the Colony

Queen bee

When everything is okay in the hive, there is usually only one queen bee in a hive. This is a female bee that has been produced by her sister bees and is the only female bee that is fully reproductive. The queen is sexually active during the early part of her life when she mates with a number of drones, and then lays all the eggs produced in the hive, unlike the workers which never mate with drones and are not fully reproductive.

The queen is fed by worker bees, groomed by them, and they take care of her waste products. She produces odors, chemical signals that are called pheromones. We call these "the queen substance." There may be a link between the number of eggs a queen lays and the amount of these chemicals she produces.

Worker bee

Most of the bees in a colony are worker bees. They are all female, but are a different caste than the queen. They do all the work in the hive and gather all the food (pollen and nectar) and water that the bees need to survive. Workers collect resin from trees to coat the inside of the hive – we call this propolis. Worker bees are unable to mate with drones, the boy bees. They have very small reproductive structures and are only able to produce eggs in the absence of a queen bee's pheromone. These eggs are unfertilized and will only become male bees (see below).

A simple photo can start a lot discussion with students of all ages. This big Texas queen has different color patterns from the next queen. Notice the variation in the color of the worker bees, her daughters. Teens and adults can handle a discussion of the multiple matings of the bees and how that influences genetic diversity inside the hive (but then some 10 year olds will know all about it too).

Compare the Big Texas queen from the previous photo with this one, with the green mark on her thorax. Compare similarities and differences.

Drone bee

The male or boy bees in the hive develop from unfertilized eggs. They are essential for the mating of new queen bees, and are produced when the weather and food supplies support large bee populations. This is during the Spring and Summer of the year. Normally, colonies of bees do not have drones in the hive during the Winter since they consume food are not yet needed for mating.

Sex determination (Teen and above)

Honey bees share a sex determination with ants, wasps, hornets and other bees. Female individuals are created from a fertilized egg or ova, where the female releases sperm so the ova is fertilized. When the female does not release sperm, or for some reason fertilization does not take place, the unfertilized individual becomes a male, or drone.

The Genetics: The fertilized females have two sets of chromosomes, one from each parent, and are thus diploid. The unfertilized males only have one set of chromosomes first those from the queen, and are haploid. Humans are diploid and have two sets of chromosomes.

Diploid - two sets of chromosomes
Haploid - one set of chromosomes

What it means to the beehive:

1. The queen controls the sex of each bee. She may not 'know' this, as evidence suggests that she acts only as a response to a stimulus. It has been shown that the queen measures the size of the cells before she lays into them and this regulates her release of sperm. She releases sperm when she inspects a smaller worker cell but does not release sperm when she inspects a drone-sized cell. The queen stores four to eight million sperm in her body after mating with 12 to 20 drones early in her adult live, and before she starts egg laying.

2. When a queen does not have sperm in her body (or if she is sterile), she will only produce drone bees.

3. Drones do not have fathers, and carry only the genetic information of their mothers. This has important consequences in bee breeding programs.

What are the consequences in a social organization dependant on females when only males are produced? Will it continue to exist?

The Annual Food Cycle of the Hive

Every bee colony must gather food to survive time periods when food is not available. In areas where there is a Winter, colonies hoard (store) food for the Winter by filling combs with honey, then consuming this honey during the Winter to keep warm. In addition, the bees collect and store pollen from flowers to put into cells. This stored pollen, called bee bread, is rich in protein and, with the honey, supplies the nutrition necessary for bee production during the Winter and early Spring when it is too cold for flowers to bloom or bees to fly.

In warmer areas there are often periods of the year when no flowers are in bloom called dearth periods.

Where would you expect to find such dearth periods in the United States? Are there any where you live?

Bees Collect Two Kinds of Food – Nectar and Pollen.

Nectar is a sucrose-based sugar produced in nectaries of flowers (and a few unique flower structures). The average nectar has about 20% sugar and 80% water. The bees collect nectar with their long, fuzzy tongue (or proboscis) and add enzymes to the sweet to break the sucrose molecule into two simple sugars, glucose and fructose. These are the sugars found in honey. The energy found in these sugars is immediately available to bees and humans upon consumption. Field or forager bees return to the hive with nectar in a special structure called the honey stomach and share it with a house bee that specializes in nectar ripening. This allows the forager to return to the field, while the ripener bee exposes droplets of the nectar-honey mixture to the warm air inside the hive to promote evaporation. After 20-30 minutes, the bee stores the new honey in a wax honeycomb.

Pollen is the male part of the floral reproductive structure, and is usually rich in nutrients the bees can consume. Pollen foragers use the pollen basket and rake system on their hind legs to collect and consolidate pollen into two pollen pellets. They add nectar to the pollen as they groom the pollen while in the field so it sticks

together better and is inoculated with beneficial microbes which preserve the pollen. Pollen foragers return to the hive with large pollen pellets on their hind legs. They go to wax cells on the border of the developing brood and kick the pollen off their legs by reversing the grooming direction. Worker bees use the tops of their heads to pack this pollen into the cells. It is available for nurse bees for consumption during brood production.

The Reproductive (Swarming) Cycle of the Colony

Bee colonies are social organisms with complex structure and behavior. One of these complexities is in the way the colony reproduces. Social wasps, bumblebees, and other social insects, establish new colonies by a single mated female reproductive (queen). For example, bumblebee queens overwinter in the leaf litter and search for a new nest in the spring. They are not likely to use the nest they were produced from in the previous year and must build their colony slowly.

Honey bees are unique in reproducing by swarming. This is an amazing process that involves thousands of bees and a queen leaving the hive to find a new home. The rest of the bees and a replacement queen will stay behind and maintain the old home site. Some colonies of bees swarm more than once each year, producing more new bee families. This is a good thing, since new colonies in nature have a very difficult time living to be one year old.

Swarms rest for a few hours to a few days while scout bees leave the swarm cluster and search for a good home. Scout bees want a cavity that is big enough, but not too big. It should face East or South, and be safe from predators. Empty holes in trees, cavities in rocks and human structures are common sites for bees to select. Once the nest is selected, the bees all fly to it and build beeswax comb and start foraging for food. The queen starts laying eggs, and a new colony is established.

2. Field and Apiary

Field session – Using insect sweep nets, small video cameras, and other tools, have students observe honey bees working flowers in a field near the classroom. This may be a break from in the lecture/classroom session. Have each student learn to recognize honey bees from other bees. Have them learn to identify the bees with nectar gathering behavior and pollen gathering behavior. Ask if they find any queen bees or drone bees on the flowers.

Buckfast drones and worker bees on a honey frame. From Ontario, June 2011.

Apiary session – On the first visit to a bee colony, review of the parts the hive (hive body, frame, cover, bottom board), protection gear (veil, suit, gloves) and tools (smoker, hive tool). It may be necessary for the bee colony to be placed inside a cage to keep the students out, or bee veils and protective equipment may be necessary for all students. School and Nature Center policies vary as to the degree of contact students may have with certain animals, so make sure you discuss this thoroughly in advance with the administration. At very minimum, parents of children and all adults must sign a permission waver of liability. Talk to the school nurse about the availability of an Epi-pen in the event a student develops an allergic reaction.

In the bee colony, make sure to show all the key features of the hive: frames, honeycomb, brood comb, honey storage comb, worker bees, queen bee, drones, brood in all stages, stored pollen, stored honey and more. Look for bees that are sharing nectar, and for bees returning to the hive with pollen.

3. Laboratory with Observation Hive

If pre-arranged with the beekeeper, move one frame of brood and bees from the colony, preferably with the queen bee on the frame. Gently put this frame into an observation hive and take the hive into an observation area for detailed study in a safe environment. Alternately, you may have an observation hive established in the classroom prior to the class so it may be examined by students. They should locate the three members of the beehive, find bees engaged in food gathering, comb building and communication dancing. Look for the brood stages of egg, larva and sealed pupa. Look for drone brood and a possible queen cell.

Watch the Queen

If possible have the queen marked with a drop of paint on her thorax. This will let you keep your eye on her as she works on the comb.

Make a time sheet, with a column with the start time and intervals in a column, and a second column recording the activity of the queen. I suggest each student be allowed five minutes of examination time, perhaps in groups of two or three. If possible repeat this during the next class period:

0:10	Queen found on brood frame
0:30	Head in a cell
0:40	Reverses abdomen into cell (to lay egg?)
0:60	Walks around comb
1:30	Inspects cell
| |	| |
4:50	Resting on comb, bees around her

Watch Workers

(Have the beekeeper mark a number of worker bees on the thorax with a drop of colored paint different than the color of the queen. Ask that some bees be young and others field bees, if possible).

Method

Have each student or group of students watch single worker bees for a three to five minute interval, and then

move to another bee. If they loose sight of a bee, have them continue with another.

Record the activity of the bee and what she is doing. Emphasize what they see the bee doing, without drawing a conclusion until finished with the observation period. Be careful about giving away the answer so the student can work it out.

0:10 Worker with paint found
0:30 Touching tongue with another bee
0:40 Bee quiet on comb
|| ||
2:50 Bee continues to be quiet on comb

Have each student suggest what job or role the bee is conducting: nectar processing, pollen processing, attending the queen, wax secretion, brood feeding, guard bee, undertaker bee, etc.

Conclusion

At the end of this session or series of sessions, each student should have a good introduction to the world of honey bees and the activities of beekeepers. Many of these areas we will revisit, so this is just a taste of what is to come. Encourage students to learn more from reference books, online, and from other sources.

Adult groups can experience all of this in one day. It is an ideal lesson for a beekeeping school to spend time with classroom, field, apiary and laboratory sessions. It should give each adult a good feel for what is involved in keeping bees and bee biology. BC

Vocabulary List

Abdomen	Fertilized	Pollen
Allergies	Food Cycle	Proboscis
Apiary	Forage	Protection Gear
Bee Bread	Frame	Protein
Bottom Board	Haploid	Pupa
Brood	Hive	Queen Bee
Castes	Hive Body	Reproductive Cycle
Cells	Hive Tool	Resin
Chromosomes	Hoard	Simple Sugars
Colony	Honey	Smoker
Comb	Honey Stomach	Social Organisms
Cover	Honeycomb	Sperm
Dancing	Inoculated	Sterile
Dearth	Larva	Sucrose
Diploid	Microbe	Swarming
Drones	Nectar	Thorax
Enzymes	Nurse Bees	Wax
Epi-pen	Ova	Workers
Evaporation	Pheromones	

Resources

Reference Books:

Caron, Dewey, *Honey Bee Biology and Beekeeping*, Wicwas Press, Kalamazoo, MI, **ISBN-13:** 978-1878075093

Webster, Thomas and Caron, Dewey, *Observation Hives: How to Set up, Maintain and Use a Window to the World of Honey* Medina OH, **ISBN-13:** 978-0936028125

Winston, Mark, *The Biology of the Honey Bee*, Harvard University Press, Cambridge, **ISBN-13:** 978-0674074095

Online beekeeping classes:
http://www.cals.ncsu.edu/entomology/apiculture/BEES.html

Video on line:
http://www.extension.org/pages/28042/honey-bees-and-beekeeping:-a-year-in-the-life-of-an-apiary

To find out travel plans, classes and see our book store check out ***www.wicwas.com*** *or sign up for our newsletter at* ***www.honeybeespeak.com***

Increase Essentials *will help you with nucleus setup and management. Consider Ed Simon's new* Beekeeping Equipment Essentials *for equipment construction.*

A simple, one deep frame observation hive. (For plans, see http://goo.gl/NKxKT)

Starting & Maintaining An Observation Hive . . . *Of Your Very Own*

James E. **Tew**

Grandkids, Observation Hives And Me

Without a doubt, ***the*** most popular bee thing I do with my grandkids is take an observation hive to their classroom. I would love to tell you that all my age-appropriate grandkids are consumed with bees, but they are not. In fact, they are very cautious about bees in general, but when I show up in the classroom – *dangerous* bees in tow – they suddenly become all mouth and authority. And it is true that all the other kids sit in amazement. Of course, my grandkid-of- the-day is my able assistant. At that moment, we both look good and looking good feels good.

In fact, observation hives interest most people. It gives one a chance to see bees up close and free from the threat of stings. Since it's normally a small hive with few parts, new beekeepers frequently assume that it will be simple hive to initiate and operate. That's not true. Glass-walled observation hives are an especially unnatural environment for a bee nest. If one plans to maintain a permanent observation hive, one needs to be skilled in both bee biology and behavior and have a good observation hive design. Observation hives differ from standard colonies in several major ways.

Light

Light allows the observer to see every part of the observation hive and what's going on. The problem for the bee nest within the observation hive is that bees prefer their hives to be dark. In fact, light inhibits the production of wax. Yet, without light, there is no observation hive. Commonly observation hive sides are covered by panels made of hardboard or expanded-foam insulation that are kept on the glass walls when bees are noton display.

Size

Observation hives are generally small hives – frequently only one deep frame. That makes them lightweight and easy to transport. However, these small hives do not winter well. They are too small to perform cluster mechanics efficiently. Even if the hive is in a warm house, there are potential problems. Bees tend to fly freely on days that are too cold – probably due to the unnatural wintertime heat of the house; so many beekeepers only maintain the colony during warm months. As the Winter season approaches, the observation hive is combined with an established colony. The observation colony is then re-established the next Spring. Of course, a queen is lost using this procedure.

An alternative to seasonally breaking down the observation hive is to maintain a hive large enough to support itself through Winter months. Such a hive would have to be made of a minimum of three frames and would survive even better if it were as large as nine frames (three frames tall, three frames wide). Such colonies survive seasonal variations better, but due to their size, they are much more difficult to manage. Because of the greatly increased number of bees, the chances of seeing the queen are greatly reduced. In such a hive, crowding is common which causes Spring swarming. (In a sense, a spring swarm is an observable event, too.)

Disease and Pest Control

In any bee colony, diseases and pests must be constantly controlled. However, in the case of a small observation hive, if it were healthy when established, there should be little danger of diseases or mite buildup during the few months that it is established. However, in larger observation hives that are maintained throughout the seasons, standard controls for mites and other bee diseases are important.

Access

Opening a standard beehive is relatively easy. Just use some smoke and remove the top of the colony. However, with an observation hive, the hive must either be taken outside or worked in a darkened room allowing some of the bees to escape. One must expect a few bees to occasionally get free into the room when the hive is opened or moved. Plan accordingly. If bees can be allowed to escape in the building, then the beekeepers can work inside without disassembling the hive. After completing

A portable one-frame colony. Easy to carry but can't see some of the comb.

the job, the room can be darkened except for one window. Bees in the room will fly to the window where they can be freed or captured. Various types of doors or slots can be developed on the observation hive body to allow access for installing mite strips or pollen patties. Also, such openings are good for holding a queen cage. However, there are no standard plans for any of these suggestions. Remember that slots and grooves are quickly filled with propolis or burr comb in the observation bee colony.

Feeder Access

Preparations must be made that allow quick and efficient feeding device installation. Bee populations in observation hives are small requiring that they be fed frequently. If observation hives are wide enough, holes ($2^{7/8}$" diameter) can be cut in the top to accommodate common jar or feeder lids. Boardman Feeder lids that are already perforated for external hive feeder use are frequently useful for feeding observation hives. Common jars such as mayonnaise jars can also be used for feeder jars. Ironically, honey jars, having small openings, make good feeder jars. If the hive top is too narrow to accommodate such a large jar, many beekeepers use "squeeze' bottles with a narrow pointed opening. The inverted squeeze bottle is put in a small opening (approximately ½") on the hive top. There are many other ways to accommodate feeders. Plus, if the hive is in a public location, care must be taken to avoid tampering with the container.

Ventilation

Observation hives require more ventilation than standard hives. Standard hives usually have cracks and crevices for air to enter or exit. The observation hive is, by design, a tight hive. Also, the glass walls can catch long-wave radiation and cause excessive heat built-up within the hive. Carbon dioxide build-up can also be problem at any time. Another important consideration is the ventilation "draw" that a highly insulated, tightly-built house has. A forceful stream of air can be drawn into the hive entrance, then through the observation hive body, and out the hive's ventilation holes into the house. This is especially serious during cold months when the cluster is trying to regulate its nest temperature. For ventilation within the hive body, large holes (as large as the sides or top will structurally accommodate) should be drilled and covered them with 8-mesh hardware cloth. A screened opening near the observation hive entrance should be provided to allow air being drawn into the house to escape before being drawn into the observation hive.

Population

The observation hive should not be packed with bees. A hive that's too full of worker bees does not show the other characteristics of bee biology. Ideally, the viewer should be able to see: bee dances, wax comb, capped honey, all stages of brood (eggs will be difficult to see), drones, pollen, the queen – which is commonly marked with a spot of enamel paint – and finally, worker honey bees.

A small hive should be started in early spring after pollen becomes available, with a frame that is approximately 50% covered on both sides with (mostly) capped brood. The frames should have capped honey in the corners. Enough bees should be added to lightly cover the frames with worker bees. A new, marked queen must be included, and the new colony must be fed. If this hive is set up in the spring, the colony will grow quickly. Once it becomes too full, a frame and some of the adult worker bees should be removed and replaced with a frame that is nearly empty to allow the process to begin again. This will give the queen a place to lay eggs and will help to inhibit swarming.

Appearance

The hive should always be maintained correctly. In most cases, an observation hive is a teaching tool for the beekeeper to use when educating the public. If the hive has a layer of dead bees covering the bottom of the hive, the uninformed public can get the wrong impression of bees' worth. In this case, no hive is better than an observation hive in bad shape.

Locating The Observation Hive

Installing the observation hive in a building is nearly always a challenge. I can't mislead you here. Many times, I have seen a board put into a partially-opened window. In the board an opening is bored to accept the entrance of the observation hive. The window screening must either be removed or modified. This leaves an opening higher up on double-hung windows that allows bees and other insects an alternative entrance. Obviously that must be closed with packing of some kind. You see where all this is going. There is no "standard" way to install an observation hive.

For those with more than a little construction experience, a hole is sometimes bored through the wall. All utilities must be considered. Boring into gas, electric, or plumbing would be very bad. I am considering putting my large observation hive (nine deep frames, three frames on three frames) in the wall of a lean-to porch that is attached to my shop. This location will work about 9 months out of the year. Those of you in warm climates can possibly have a large observation survive throughout the year. I can't.

Heating An Observation Hive – An Experimental Question

If any of you have experience in heating an observation hive, I would like to hear about it. It would seem (with-

out ANY experience on my part) that a plumbing heat tape or some other thermostatically controlled device could be used to supply modest heat to the wintering observation hive. It would only need to be kept in the high 40°s - low 50°s F. to help the colony survive. In this way, my large observation hive could be given heating assistance to get through the three cold months.

As you and I know, nothing is as easy as it looks. No doubt there are numerous bugs to be worked out when exploring supplemental heat for such a hive.

Some less-than-positive-attributes of observation hives

Odors

A healthy observation hive initially has a "clean straw" smell – or maybe the odor of a clean animal. I don't actually know where the odor arises. I like it at first, but after a week or more, I begin to tire of my work area smelling of clean animals. During Fall months, the odor of goldenrod honey can be particularly pungent within the household. I am voicing a strange complaint. This natural, healthy odor is not a bad thing, but rather it can become too much of a good thing.

If the hive begins to fail – for whatever reason – fetid odors can result from the decay process. No doubts here – this odor stinks. And this is a double problem; for not only does the dying colony smell bad, it looks bad, too. This becomes an issue when observation hives are installed in public places like zoos or nature centers. Hives situated in high traffic areas require constant maintenance. A poorly maintained hive makes for a poor impression.

Some individuals are allergic to bee hair, bee excrement or even propolis. For most of us, this is not an issue, but for a few, this may have a direct bearing on the location of the observation hive. *(I have a slight, but noticeable allergy to bee excrement. It makes my nose run and my eye lids itch.)*

Outside the external opening

All that bee traffic outside the building will result in fecal spotting and some staining on the side of the house – and anything else in the vicinity. Cars seem to be a particular problem. This characteristic is true not just for observation hives, but much more so for full-sized colonies. I could go astray here with many stories of beekeepers having to move yards due to fecal spotting on neighboring property. Ironically, in years past, laundry hanging on the line located near the exit was frequently soiled. Clothes dryers fixed all that.

Insecticides

Of course, pesticide use around an observation hive is "iffy." I know that many of you would not use pesticides under nearly any condition, but it can be surprising how susceptible these colonies are to airborne pesticides. Common sprays (I am reluctant to list them, but they are available in any garden supply section.) will agitate the colony and even kill it. Then the hive enters the "putrid" stage discussed above. "No-pest" strips and DEET can cause upset to the colony.

Of course, pesticides applied outside in the environment and its effects on the observation hive are very nearly the subject of another article – but the effects are the same. Such pesticide exposure at best, results in a weakened colony and at worst, results in a dead colony.

Beekeeper Competence

If you can keep an observation hive in good shape all through the year, then your chances for keeping a standard hive alive outside are excellent. Observation hives are excellent teaching tools for all beekeepers. They help beekeepers learn and they help beekeepers teach. No bee operation, of any size, should be without one. BC

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Small Scale Commercial Queens

Feeding, Booking Orders, Quality

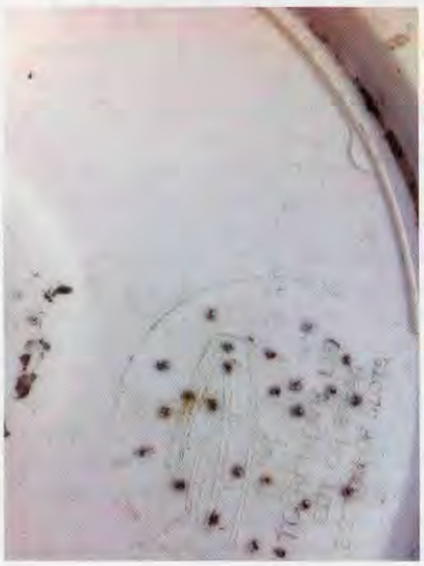
Dann **Purvis**

Downloading Sucrose syrup for late Spring feeding. Notice the syrup totes on the red flat bed truck use gravity to download syrup into buckets from both sides of the truck bed-simple and easy. Note: Paul Johns is sitting on top crossed leg while holding the hose down in each tank for filling.

If you are getting tired of buying higher priced yet lower performing queens, why not try producing your own? Saving money is one definite benefit in doing so. Making a profit through the sale of extra queens is another. The demand for high quality queens is extremely high.

For us, queen production evolved from our efforts in the research and development of the Purvis Goldline Survivor line. Breeding and producing queens are definitely two separate efforts. Financing a breeding program that uses heavy Natural Selection as its model (our goal was 50% attrition each year) was very expensive. Queen production helped offset that expense. At first we gave away breeder queens in an effort to expand the genetic footprint. It wasn't long before we realized our own financial survival dictated that we would start charging for them. Since then, we have NEVER been able to meet the demand for queens. Our goal has always been to help the bee community, and this article will continue that goal by passing on some hard earned and expensive lessons.

This is the second in a series on Small to Mid size Queen Production. The last article was mainly conceptual and covered the nuts and bolts structure of a queen production business built upon 500 mating nuc/100 colonies. This time we are going to jump right in with the new year and go into tasks that a producer must complete. This brings us to the important topic of:



Top of 2½ gallon syrup feeding bucket with approximately 25, 1/16" holes drilled in lid. Notice they are all placed in a small patch and the lid of the bucket has a 3/8" lip for bee space.

Feeding

For us, the first day of the bee season starts with the new year and is when we start feeding bees. Feeding at this time of year will seem ludicrous for some folks especially in the Northern areas. But I am sure you will be rewarded with more bees if you learn to give an earlier feeding program a try. The only risk you will possibly come up against is while waiting for the hatch-out of the first brood cycle. This is when a smaller cluster is most vulnerable because they are not as able to thermo-regulate as effectively as when they had no brood to keep warm but do have empty cells to withdraw into to form a more compact cluster.

Use ***thin Sucrose syrup*** only. This will stimulate brood rearing and give you the needed strong colonies to use for bulk bees, finishers, splits and drone stock. You can buy Sucrose syrup or simply mix your own (simple cane table sugar). The only down side with Sucrose is the tendency to ferment if conditions are right, and can solidify if not used quickly. However, due to colder temperatures of early season feeding, fermentation is not as big a problem as it would be in the Summer. Of course the bees will not be taking it in as fast for the first feeding but it usually works out well. Mix by using equal parts of sugar and hot water.

I am firmly convinced that bucket feeders are the best feeder for most situations. I have tried them all to include hive top feeders (HTF). HTF would be my second choice, but way behind buckets, and only if I used window screening over the top to keep bees from entering, drowning and therein providing protein for Small Hive Beetle (SHB) larva. Open container feeding of syrup for mating nucs in high population areas of SHB for anyone except very small producers simply will not work. One last point: How often should you feed? Answer: If they take it, poor it to 'em. Don't worry about over feeding. With the mating nuc supers on top of the

Feeder bucket tilted back showing the bee access hole. The same feeder can be used inside of an empty deep box or temporarily on top of an inner cover. We cover the hole with a brick if not in use in the Winter otherwise it is left open.

colonies, you will be able to trigger stimulation while at the same time pulling and storing frames of honey to use when establishing your nucs in a few months. This saves time and effort without sacrificing quality.

We progress into ***feeding protein*** later as the colonies are able to consume it. The only two times that I will use a pollen patty is: (1) sometimes right after the first brood cycle emerges (and well before pollen collectors can collect it from a barrel feeder or natural sources) and (2) with my starter/finishers throughout the season. DO NOT feed too much patty at once and watch it closely. Otherwise, SHB will get'cha! I truly believe that one of the reasons SHB is such a small problem for us is that we have learned how to manage the use of protein. Untimely or unmanaged use of protein results in larger and earlier beetle populations later on in the Summer. In short, feed the protein to the bees not the SHB. If you put on a patty and the bees can't eat it up quickly enough you will start to see small SHB larva. That is a key indicator that the bees are not taking in the protein quick enough. SHB like wet rather than dry food which is yet another reason I prefer open barrel feeding of dry pollen substitute versus pollen patty. Here is how we feed dry pollen substitute: Place a 55 gallon drum laying on its side with just enough tilt to keep water from draining in. I also place chicken wire over the opening and use the barrel band to hold it in place. This will keep the skunk-sized animals out. Put no more than two shovel scoops of powder at a time. The bees will work it so vigorously that it will inch toward the opening of the barrel. Initially, I will come back about every two weeks to bring more buckets of syrup and add more protein to my barrel(s), if needed. If there is a good pollen flow, the bees will choose to work the trees, thus putting the barrel feeders on standby so to speak. Having protein available throughout the season will keep you from getting caught flat-footed by a surprise pollen dearth and subsequent loss of drones.

Now let's talk about ***feeding mating nucs.*** Many years ago, a SHB maggot nightmare led us to the use of a dry invert sugar named Drivert. It is expensive to start with but the shipping cost from the West Coast (the only place I have found it) more than doubles the expense. It is still worth it and once you use it you will see why. For hot and humid areas, this stuff makes it possible to cut down or completely eliminate the need to reestablish SHB crashed boxes while at the same time, not use ANY harsh chemicals. I would use this stuff even if SHB was not an issue.

Simply mix equal parts of dry cane table sugar with Drivert. We mix it in a barrel and quickly place it in five gallon buckets with airtight lids. Drivert is like honey in that it is hygroscopic (attracts water out of the air). When establishing the nucs, we will take a cup of this mixture and put it in the feeding chamber area even if we have frames of honey. We also use it later in the season during nectar dearths. You can actually poor it over the top of the frames if needed (providing you don't have screened bottom boards). This mixture soaks up the moisture in the air at just the correct rate. Bees confined in the mating nucs actually draw comb on this mixture during the short dark/cool storage period in which the queen is emerging from her cell and before being moved/released into the mating yard. The bees will "eat" up any moisture in the mix before it gets too wet, keeping the SHB from having anything to get a foothold on. I am not

BOOKING ORDERS

We start booking orders on a "first come/first serve" list around the first of the year. I STRONGLY recommend you show absolutely no favoritism. It is bad for business and is not the way I want to be treated. Make sure you treat your smallest client like your largest. I have turned away very large and lucrative orders because the little guys were more diligent and got on the list first. This will pay you back in the form of a better nights sleep and in developing client versus customer relationships. I have clients/friends that have been with me since we started selling commercially. A more accurate statement would be that we have been together since the beginning. And they know that if they aren't on the list first they aren't going to get ahead of anyone. They appreciate that and I appreciate them.

Do not overbook. By all means underbook! At the same time, have a list of on call folks that will take whatever you have on a moments notice and you will never have to bank your queens for more than two or three days.

To estimate how many queens you will produce, estimate 75% for the first cycle or first three weeks. After three weeks, step up your estimates to 85%. What's the bottom line? It means you should have in the neighborhood of about 125 queens to sell for the first three weeks and about 142 per week for the remainder of the season, except the tail end when things start to get a little iffy. **However, I would not book more than 100 queens for the first three weeks and no more than 120 for most of the rest of the season.** Stand bys and last

sure how well this would work in dry climates. A possible suggestion if your area is dry simply cut out some or all of the cane sugar (not as hygroscopic) to make the mix more hygroscopic. After the nucs are set in the mating yards and released you will not have to concern yourself with how dry the environment is. A clean water source close to the mating yard is not an absolute necessity but I have noticed higher percentage yields in yards that have a nice stream running close by. I don't like ponds because I have noticed the opposite with them. I cannot prove it, but I attribute it to increase in predators such as Large Green Dragonflies, Barn Swallows, Purple Martins, etc. One last thing concerning Drivert: don't try mixing it with pollen substitute thinking you can kill two birds with one stone. The bees **will not** take up the wetness of the pollen substitute quickly enough and you will have SHB problems shortly. Because mating nucs are smaller and sometimes queenless, they are at greater risk from SHB.

Some may think that all my talk about SHB doesn't apply to them. I hope that it stays that way for you. But just in case it doesn't work out that way, I have shown you one or two methods that we use to keep from going the chemical route. Do not manage beetles using chemicals-period. It's not necessary, causes many problems later on and is dangerous to you and your bees.

Can you raise queens without supplemental feeding? Absolutely! It will cost you something somewhere, though. Regular harvesting of bulk bees, brood and stores to establish your mating nucs and starter/finishers places a huge burden on your hives. Unless you are blessed with a series of good nectar and pollen flows throughout the entire season, you will definitely need to supplement. Another critical point is, if the pollen flow stops, drone production will eventually stop regardless of the nectar flow. If the pollen flow has stopped and the days are getting shorter, the colonies might start kicking drones out. As a queen producer, that is a BAD thing. There is a quick fix for this by the way, but if you don't know what it is, you will not have drones for your virgins to mate with in short order, and possibly not for the rest of the season.

An old barrel with chicken wire works excellent for yard feeding dry pollen substitute.

Yields

By now, you are probably wondering what this size operation will yield. Keep in mind my numbers can differ from others for a variety of reasons, but this will give you a good estimate to compare or implement.

First let's talk about ***cell yield***. For some absurd reason, high percentage yield on cell grafts is held in high esteem in many circles. The general consensus is that higher is better. There is some truth to this but let me share with you the whole truth. Swarm boxes, divider boards or other queenless starter/finisher systems being largely promoted in books, master beekeeping courses, short courses, etc., are good for getting high takes but not good for the very highest quality queens. Unarguably, queenless starter/finishers are easier to work and yield a higher percent take. Having produced tens of thousands of queens, and taking into consideration my client feedback, I am firmly convinced that producing cells using queenless starter/finishers ***do not*** yield the very best queen. I am also cognizant of the fact that the closer you approach the natural swarming characteristics used with queenright starter/finishers, more time and energy is required, and will result in a lower yield in cells produced. However, in most cases, the contrast is not only observed in size and general appearance. The biggest difference is ⇨

minute callers usually eat up the late summer queens. **At any rate, do not book more than 75 to 100 for the late season.**

You will get more experience as time goes. We have always sold all our queens before the end of the season. As a reminder, the production for our model is based upon a three week old queen. If you were running a two week queen, then you would increase your production by almost 75 queens per week. That is very enticing and looks good on paper but if you want to produce queens this way, do us all a favor and get out of the bee business. "Two weekers" are not worth a hoot if they are not introduced immediately and laying within a day or two at the most. These immature queens are not usable unless you are producing them for your own use and you know how to direct introduce queens. I still don't recommend them because direct introducing a two weeker is not as good as a direct introduced or even a cage introduced three week old queen. If you have a bumper crop on a particular week, give the next person on the list a call and see if they want them. What do you think the answer is 99% of the time? A good stand-by list for late callers is a good tool for any extra you produce, also. Bottom line is treat your folks like they are your friends and how you want to be treated.

I find that customer service or phone time is one of the funnest parts of beekeeping. My wife hates it when I answer a phone call. It usually means I am taking at least a 30 minute break. That is why she usually answers the calls now. One last thing about problem customers. Beekeepers are usually opinionated unlike myself of course (don't argue with me on this). You will find that sometimes, getting a person to change his mind is just not worth it. DO NOT get caught up in jumping through hoops. Some folks naturally like to see you jump through hoops. You will never hear me say, "the customer is always right." I've been in beekeeping too long-thank you very much. But we do love 'em and try to take care of them as best we can. Honestly, some of your customers do not know what you know about queens. It isn't because we are so smart. It is because we have handled thousands and thousands of queens under today's current situations which are night and day different from 20 years ago. **The goal is to help the beekeeper and not sell them a bug with four wings.**

We keep Drivert (powdered invert sugar) in long term dry storage to ensure we always have it available.

Looking down into a mating nuc super. The buckets go on in early January to stimulate brood earing and to fill frames with food for the mating nucs that will be established later in the Spring.

in how well the queen performs and how long she will last. As in most things bee related, the best method is to copy the natural behavior of the colony. When the colony reproduces, does it kill the queen and then draw out cells (emergency cells) from worker brood? No, instead the colony will draw out big, well fed, well placed, well timed swarm cells that are treated like royalty from egg to queen before the queen leaves the hive. The closer we can mimic the swarm cell, the higher the quality the cells will be. Accordingly, the very best queens I have ever produced have been grafted from eggs (without touching the egg-another time/article) into queen-right starter/finishers and with the queen being harvested from the mating nuc after at least one month. The yield for this kind of cell is at best 35%. If I thought the market would bear it, I would produce more in this manner.

Having said all that, I have and will from time to time use queenless starter/finishers. There are certain times and conditions that nothing else will work but a queenless starter/finisher. My yield for a queenless system will usually be in the mid to high 90 percentile. ***The yield for my queen right starter/finishers usually ranges from 60 to 80%.***

Finally, always over graft the number of cells you will need. Keep in mind, the last thing you want to have happen is not having enough cells. To begin with, plan for 2.5 cells per mating nuc. This number works well with the 10 planned starter/finishers for this model. At worst case, you will have at least one cell per nuc, and at best over two per nuc. The goal is two cells per nuc. With two cells per nuc, your queen take/yield will be higher and is worth the extra effort.

This leads us to the mindset of: "Learning to throw extra cells away and kill substandard queens." Don't get emotionally attached to either. As an alternative, you can trade or sell last minute extra cells. However, never sell or give away substandard product of any kind. It will come back to haunt you. It's a balancing act sometimes-economics versus quality. My advice is, if in doubt, error toward quality. A great question to ask yourself from time to time is: would you pay what you are charging?

Now for ***queen takes***. My definition of "queen take percentage" is this: the number of queens shipped or used divided by the number of working mating nucs multiplied by 100. This bottom line number also includes several factors other than queens not making it back to their nuc after a mating flight. For instance, strict culling of inferior queens will knock the number of takes down. The actual yield will increase after your mating nucs go through their first cycle with the highest yield hitting around the time the Blackberry blooms. These numbers are usually pretty consistent and will not vary more than 10% for the most part. ***Actual yield for queen take percentage is 75 to 85%.*** Yes, I have had high 90's but that is not the norm. Overall, these numbers will serve you well. BC

Next we'll discuss more about the operation to include administrative tasks. Purvis Bees, Inc. ***www.purvisbees.com***

All The Buzzz in...

Hello Valentine,
Thank you for being my special friend.

Bee B. Queen

Bee B. Queen Challenge

Send us your artwork.

Matthew Day, 5, SC

Chloe Pegoraro, 8, ID. "Worker Bee"

Luke Pegoraro, 5, ID
"Our House"

Children in Haiti having fun with their bee masks.

Beekeeping in Haiti

Bo Sterk was in Haiti one month before the terrible earth quake hit in January of 2010. While there, he taught beekeeping classes for forty people in the mountain village of Plaisance-du-Sud. One man walked four hours each direction just to take these classes. Bo used pictures and an interpreter to teach the people. Wood is expensive so Bo designed a small top bar hive that can be built for $25. There was only one hand saw and one hammer in the entire village to build the hives with. Bo is working on making hives from steel drums.

Smoking a log hive.

About Haiti
Haiti is on the island of Hispaniola and borders the Dominican Republic. Many people in Haiti are very poor. Only 25% of the people have electricity.

People have to be resourceful and creative. One man made a bee smoker using a coffee can. Another made a veil out of a shoe box.

These are hollow log hives that are common in Haiti. The ends are made from palm fronds woven together. Bo showed people how to take the comb from the log hives and put them into a top bar hive using fabric strips like little hammocks to support the comb.

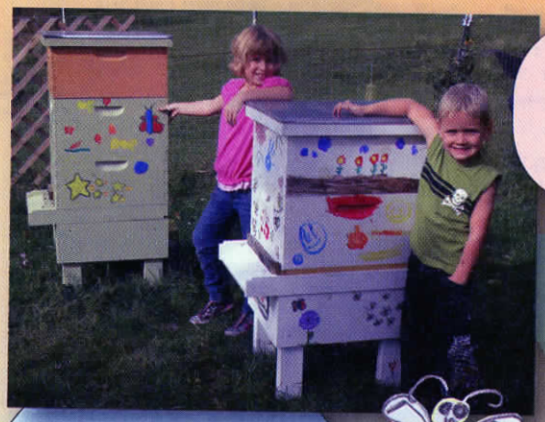
About Bo Sterk
Bo has been keeping bees for over 17 years. He is an artist and illustrator living in St. Augustine, Florida. As a volunteer, Bo has also worked with beekeepers in Barbados, St. Vincent and the Grenadines, Grenada, Dominica, Guyanna, and Tabago. He received the Volunteer of the Year Award from FAVACA and the Advanced Beekeeper of the Year from the University of Florida Bee College.

To help these beekeepers, you can make a donation to FAVACA (*Florida Association for Volunteer Action in the Caribbean and the Americas*).
Go to www.favaca.org.

Your mission, if you choose to accept it, is to find all these places on a m

Bee kid's corner

Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
February 2012



This is Chloe and Luke Pegoraro of Idaho posing with their painted hives. They are both great beekeepers and have their own bee suits and help mom with the hive.

Haitian Doughboys

1 egg
1 c. flour
1/2 c. sugar
Pinch of salt
3 bananas, pureed
1/2 c. water
1/4 tsp. each vanilla, cinnamon and nutmeg
Oil for frying

Combine flour, sugar and salt in medium sized bowl. Stir. Add remaining ingredients and mix well, forming a thin pancake-like batter. (No baking powder or soda is used.)

Heat 2 cups vegetable oil in deep skillet until very hot. Pour one ladle full of batter into hot oil. Fry on one side until golden brown. Then turn and fry other side. Drain on paper towel. Sprinkle with granulated sugar and eat warm. *From Cooks.com*

Bees Buzz Song

Words by Kim Lehman
Sing these new words to the traditional French tune "Alouette".

(chorus)
When the bees buzz,
When the little bees buzz,
When the bees buzz,
Buzzy, buzzy, buzz.

Helping nature pollinate,
Everybody thinks you're great,
Pollinate,
Think you're great...

Oh...(repeat chorus)

How Do You Say...?

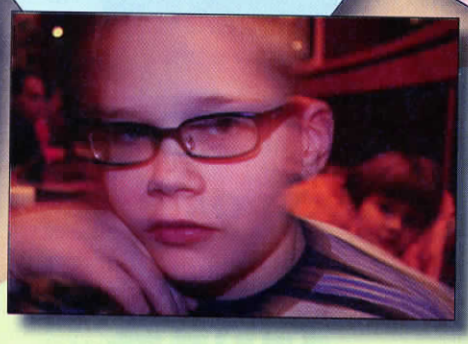
The official languages of Haiti are French and Haitian Creole which is a combination of French and various African languages.

In Haitian Creole "*bee*" is "*abèy*" and "honey" is "*siwo myèl*".
In French "*bee*" is "*abeille*" and "honey" is "*miel.*"

Unscramble these letters to discover another language that uses the word "miel" for honey.

SNHISAP

Carnival is the biggest celebration in Haiti. It is a colorful celebration with parades, music, dancing and costumes. This year it will be celebrated on February 21.



Bee Buddy

Ryan Giminiani, from New York, learned about the decline of honey bees while working on a presentation with his 4-H club. He wanted to help bees, so with some assistance, he start keeping bees. Ryan even founded his own 4-H club focused on honey bees. One thing led to another. Now Ryan has a line of lip balm called Honey 4 Autism Lip Balm. He donates 50% of the proceeds to the Autism Society. "This is important to me because I care about all kids, especially kids who are just like me." So far Ryan has raised $251.75.

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

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.

Spanish

To Italy And Beyond

Lady Spirit **Moon** • Center For Honeybee Research • www.BEeHealing.org

In 2010 I contacted the Federation of Italian Beekeepers (FAI) in Rome requesting to meet with an Italian beekeeper when I visited Turin, Italy, as a Terre Madre Delegate from U.S. and as Ambassador for the Center for Honeybee Research (Center).

Pietro Viazzo, a retired 18-year board member of FAI agreed, and his family met me at my apartment in the center of historic Turin. Since my visit Pietro and I have kept in close contact, and he arranged for meetings with other beekeepers around Turin. His sister-in-law, Rosa, was my nine-day host during my September, 2011, 17-day European trip. I connected the Center with commercial beekeepers, large beekeeping organizations, and Italy's largest beekeeping research laboratory, Council for the Research and Experimentation for Agriculture, (CRA-API), and National Beekeepers Consortium, Coltibatori – Biodiversity (CONAPI).

FAI was formed in Rome when all of Italy's beekeepers united in late 1950s. In the 1960s APIMONDIA branched out of FAI. The National Union of Italian Beekeepers Association (UNAAPI) also branched off from FAI and organized the commercial beekeepers of Italy. I met the secretary of UNAAPI when I was at the International Honey Bar at Terre Madre, 2010. She's also the one who arranged for me to meet with CONAPI and Andre Besara, bee inspector and associated with CRA-API.

In between touring Northern Italy with Pietro and Rosa every other day, we also visited three beekeepers. The first stop was Il Miele della Vita (The Honey of Life) at Villaestellone where we were met by Michela Gaido, a slender grey-haired, ex-banker, Yoga Master and his English-speaking worker and translator, Vincenzo D'Aloisio.

Michela has about 350 hives and makes his honey vinegar by mixing five parts water to 1 part honey in a vat measuring about 16' tall and about 7' wide. After one month, he puts the vinegar in smaller 100 gal. tanks to mellow for a year. He also has apple juice trucked in to make Apple Cider Vinegar. One concoction he is particularly proud of is Favo Integrale Primordiale; translated – Primitive Integral Honeycomb. Made by grinding honey, propolis, beeswax, and pollen together. The flavor and texture is like eating rich, pungent, crunchy, honey. It's used for crackers and as a condiment. He makes another Nutella-like confection made with 53% honey, 28% ground hazlenut, 5% cocoa, and 4% sunflower oil. His mead mellowed for a year before opening it and tasted unlike anything I've had here in the states. He found aged, dark honey his father harvested about 30 years before. A very unique mead, like a sweet, strong lager-tasting wine.

While touring in the center of Turin, I was hard-pressed in keeping up with Rosa, 76, as she and I walked nearly five to six hours whenever we went out. Italy united in 1861 and celebrated its 150 anniversary of their independence after their revolution from General Giuseppe Garibaldi.

In Mondovi we toured the Piazza, an old Roman city sitting on top of the highest ridge located at the foothills of the northern mountains. This fort allowed the Roman soldiers a 360 degree lookout view of the whole countryside. Spaces where chariots and animals were once kept are now being used as garages or storage rooms. The patched cobble-stone streets and cement walls are original and still used today. Mondovi is a very quiet, laid back village. Stores are still small in their original structures with enough space for wares and walking; and every eatery has outside seating.

Our next beekeeper is one of Italy's most revered. Michael Campero does not have a college degree, but his 65+ years of beekeeping and keen observations of the beehives is his diploma to teach at the University near Turin. Michael is a little over 5' and reminds me of an energetic, hunched over monk as he quickly moves about his property of organic vegetables and fruit trees.

At 74, Michael doesn't keep bees anymore except for a few hives ..."To keep my hands in them." He calls himself an organic beekeeper. In Italy, organic is termed biological. He loves to teach and talk about bees. When he entered the beeyard at age nine and saw the wax moths, his curiosity was piqued. Daily, morning and night he went out to the yard, read his father's journals, and everything in the library. He observed everything he could about the bees while creating his own journal.

He shared the following:

- Workers determine the sex of the bees by creating the cell size before

Honey storage.

Honey vinegar tanks.

the queen lays the egg.

- The queen lays the eggs according to the size of the cell. This is later confirmed by Dr. John Kefuss, Toulouse, France, and Dr. David Tarpy, UNC, USA. Both say the distance the queen spreads her legs on the cell determines the sex of the bee.
- Bees do sleep.
- Drone cells open in the evening. Queens wait until after sundown. If they are born during the day, they have to wait until dark to finish her transformation.
- The queen lays her eggs in cells in a circle.

Apimondia sent Michael to Brazil to teach. They want him back for a year and have built an apartment for him. Michael is still thinking about it. He shared that Brazil's stingless bees don't sting. But the pain comes from when they get in your hair and bite . . . and keep biting. If you try to pull them off, they separate, with one part staying in the hair.

Michael knows he can't fight Bayer in Italy and so is trying to teach the bees to cope. To cope with *Varroa*, about 20 years ago he invented a frame divided into three sections, with the top of the frame blocked off about 3" (about the width of capped honey at the top of an ordinary frame.) He says this confuses the bees. The queen lays the drone eggs in one section of the three sections. After 1 week, he removes the block from the second section and the queen lays drone eggs in that section. The third week, he turns the frame around to the sun-heated side and the queen lays drones in the last section. On day 23 he cuts out the first section so that the queen can again lay Drones in that section. This method of *Varroa* control is considered biological and has been adopted by a great many Italian beekeepers.

After Mondovi, we left for Constellamonte, world-renown for its ceramic stoves. In the afternoon, we visited Alberto Olmo and his wife Francesca Fontana. Alberto is an Agronomist, one who utilizes plants for food, fuel, feed, and fiber and has a degree in Agriculture. When Alberto had worked for the International Organic Society, he learned to go biological for his bees. He also shared that aspartame, a carcinogen and bleach by-product, was originally created as a pesticide during WWII. Years later, when they found it was sweet, it was manufactured as a sugar substitute.

Francesca runs the warehouse production of their honey from their 500+ hives. Alberto has been running the queen-rearing operation for eight years by importing strong queens from other countries, Switzerland, Germany, France, etc., then mating them with drones made from strong queens imported from yet another country. Each year the 2-line genetic combination is different. They capture the drones on the 4th day and keep them separate to mate with the queen of their choice. They keep their strict genetics in their geographic area by making extra queens and giving them to their neighbors.

When working their hives, they use disposable gloves and change the gloves every four or five hives. Alberta and Francesca don't transport to different locations for pollination, but they do follow the flowers, especially Acacia.

On the 9th day of my travel I left Turin and traveled by the Bullet Train to Bologna. The distance is about 212 miles and I made it in less than two hours. The passing scenery indicated the high speed, but my body in the first-class seat felt a smooth ride. The next morning at CONAPI, I met with Elisabetta Tedeschi, Communications Director. CONAPI formed in 1978 by uniting the commercial beekeepers and farmers and has 800 members under 225 associations, including four Latin American Associations. This represents 65,000 hives from every district, 19,000 of which are certified organic. 2.62% of the beekeepers are between the ages of 20-49, and 23% of the companies are owned by women.

Elisabetta related, "In Italy there are several different official organic certifiers and we ask our beekeepers to be certified by a few which we trust more! In these 30 years CONAPI has grown and with other producers of organic food has founded one of the leading organic companies in Italy, Alce Nero (farmers) & Mielizia. Italy has 52 kinds of classified honey, determined by the European government. Every honey has to have a percentage of pollen from the specified plant to be classified as varietal and each type of honey classification is different. CONAPI bottles only eight of them. They buy about 2,300 tons of honey (45% organic) from the

The three-section frame used for Varroa *control.*

beekeepers and bottle it under the CONAPI label. If the beekeeper has several 55-gallon barrels of honey, CONAPI does a special run of filling the jars and labeling them with the picture of the beekeeper, a more expensive honey.

"In the past corn was usually rotated with other crops. With intensive farming, the corn is planted every year and weakens the soil. With a weak soil, the farmers use commercial products to strengthen it for their Monsanto corn. Monsanto puts a nicotinamide coating on the corn seeds to prevent *diabrotica virgifera*, western corn rootworm which came from America in 1868, and mice from destroying their crops. But it stays in the plant until maturity and harms bees collecting pollen and it stays in the soil for up to three years."

I learned from CRA-API that only 10% of the farmers in Italy have trouble with the rootworm. But the chemical companies have the farmers convinced they need the nicotinamide "*in case*" they have it. It was more than disconcerting to learn the farmers here in the States don't know who to believe, either. They have to make a living, so it's easier to take the short cuts to grow more food.

In 2008 the Italian Agriculture Minister and the Health Minister temporarily banned Bayer from selling their pesticide as it was killing the bees. Bayer denies this, in spite of the honey bees flourishing back to the numbers before the pesticides. CONAPI is paying a lot of money, along with other beekeeping associations, and are fighting back with their attorneys to keep the ban on. In October, 2011, the Italian government extended the ban of nicotinamide for another six months into 2012.

The morning after CONAPI, Andre Besara, Bee Veterinarian (inspector), drove me to CRA-API, a two-story building housing offices, different types of labs, and an anteroom full of antique beehives from different eras and different countries. Andre introduced me to Dr. Raffaele Dall'Olio, Molecular Biologist and Sensory Analysis, and Dr. Antonio Nanetti, Bee Pathologist and Biologist. There was a small Quonset-type greenhouse outside the building where they did studies on chemicals on bees. They treat their bees with Oxalic Acid by putting the queen into a cage in the hive to keep her from laying any more eggs. Oxalic Acid is then applied for the 25 days of bee hatching and the *Varroa* coming out with them. After the 25 days, the acid is removed and the queen is released.

Michael's beeyard.

When I mentioned I never lose bees to diseases or pests and use small cell foundation, Antonio checked his computer and in a few moments handed me a document, *Ins. Soc. Life 2: 109-114, 1998, Apis Mellifera Ligustica hived on Foundation with Different Cell Base Size.* The study indicated there were no significant drops in *Varroa* on 5.0 and 5.1 cm cell foundations, but there were a significant drop on 4.9 cell foundations. Antonio said he had forgotten about the study. The three men huddled and I momentarily lost them as they discussed doing the study themselves in the Spring of 2012. We discussed their sharing the information with the Center as we plan to do the same study in my apiaries.

Andre took me around to the hives he takes care of for CRA-API. While there, a beekeeper brought in a frame for him to check and I had my first look and smell of American Foulbrood. Folks in Italy are almost paranoid about AFB. Going into the beehives with Andre and CRA-API was one of my highlights while in Italy.

The next morning I flew out to Toulouse, France where I was met by Dr. John Keefus, a man of few,

The cage holds the queen when oxalic acid is applied.

Me, working the bees.

soft-spoken words. John's an American who met and married a French woman, Josette, in 1968 and moved to her home in Toulouse. He received his doctorate in Zoology in Germany and his minor in Entomology at Ohio State. His honey house is five minutes from home in central Toulouse and is used to boil the equipment in paraffin wax; make their foundation and melting the wax into the wire for extra strength; extracting/bottling honey; and everything else honey related. John and his son make nearly all of their own equipment. His farm is located 40 minutes out in the country and is where he cleans and stores their equipment. John keeps his 250 hives in many locations in an 85-100 km parimeter around his farm. When I asked if he treated his bees, he responded, "Why would I?"

John stated a beekeeping student in France attends beekeeping school for two years. The student then chooses his own mentor and, upon the school's approval, stays with them for several months. Mentoring completed for a season, a graduation certificate is then awarded along with the opportunity of a €50,000 ($75,000 Dollars) grant from the government for a honey bee business. If the business does not make it in the allotted 10 years, the money is paid back.

John retired a few years ago and handed the business over to his son. But he keeps his hands in the business by selling queens. World-renowned for his queens, John likes raising and selling them worldwide. John also has an apiary with another partner in Chile. He and Poncho have 4,500 hives there, and mail queens worldwide. From France, John sells sperm as well. His queens are truly reasonable, starting from €4 ($6), unless they are breeder queens, which cost about €680 (over $1,040). John knows the genetics of every queen he sells, and his breeder queens get special attention with artificial insemination from his drones on which he also keeps records. He is meticulous in his paperwork and has kept his records for over 30 years. He can lay his hands on any piece of information he wants in the yearly red journals lining his office walls about 2' from the 9' ceiling.

We talked about everything from bees to politics and I've learned he means what he says. He is as meticulous in his labor around the beeyard as he is in his paperwork. A place for everything after the spot is swept and equipment stacked in the order of use for each part of the season. I did sleep on a haystack in the upstairs loft attached to a 200-year old farm house. And he was right; I slept like a baby in a place opened to the stars and not too far from where evidence indicated an owl had eaten a dove. I did do the shovel dance at the end of the path leading to the outhouse without the house. We toted our water for cooking and drinking and filled a 55-gallon drum for baths. We cooked our meals, and what wasn't eaten at one meal was eaten at the next. Nothing was wasted.

In our talks I explained how Michael Campero observed worker bees deciding the sexes of the eggs by drawing out the cells first. John added that German scientists have done studies showing the queen lays the egg according to how far apart the queen spreads her legs. The study was done by tying her legs together the width of a cell for a worker. The queen was placed over a drone cell where she laid a worker egg. (In a personal conversation after the Center's October, 2011, event, "*What Turns Honeybees On?*," Dr. David Tarpy explained the queen has three criteria for determining what she will lay: 1) she checks the inner cell with her front legs; 2) she puts her backside into the cell to measure it; 3) then uses four legs to hold onto the cell.) It would seem the width of the cell is the final sex-determining factor.

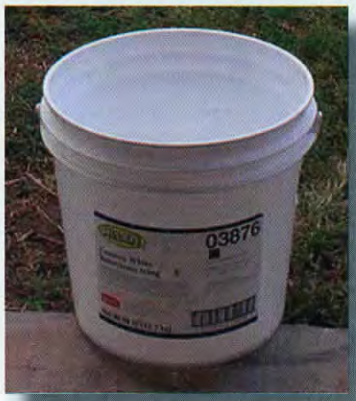
Already speaking English, French, Spanish and German, John is currently learning Chinese while working with the Chinese people with their bee population. They have had huge losses from spraying antibiotics on their bees and only have bees in a few geographic pockets across China. He is teaching/working with their scientists and beekeepers, especially with artificial insemination and queen rearing. China loves honey and John strongly feels in the future they will be this country's largest honey buyer.

John shared a few of his documents for studies the Center plans to do in my apiaries in 2012. He also shared his 20-min. video on how to arrive at the percentage of *Varroa* in the hive. John said he would be glad to speak at our 2012 event if he can work it in with his other engagements.

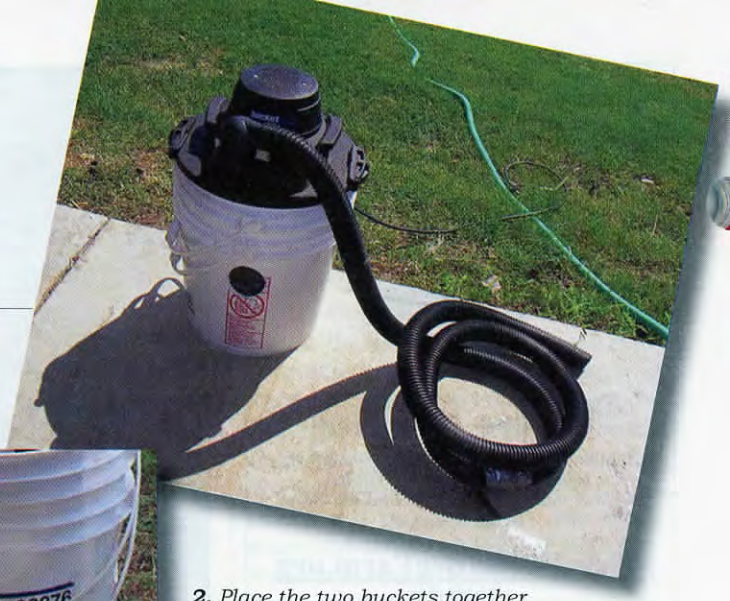
BEe Healing Apiary, and on behalf of the Center for Honeybee Research, is sponsoring an African Project in Senegal, Africa. Andre Wale Ndiaye, will intern with us from February through August as our first International Beekeeping Student. While here, he will learn beekeeping, herbology, and Apitherapy. We are hoping this paves the way for future international students. It may also prompt a future visit to Africa. BC

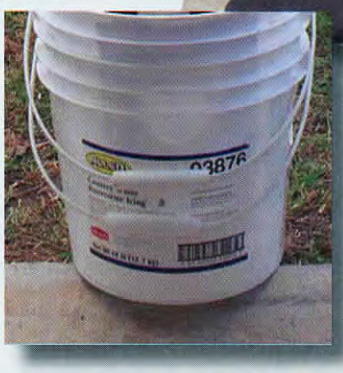
MAKE YOUR OWN BEE VAC

Rick **Hall**



1. *Start off with two buckets . . . most people will use two five gallon buckets. My vacuum is made from two 4½ gallon icing buckets free from my local Homeland bakery.*





2. *Place the two buckets together and make sure the handles line up – they will be your reference points when making adjustments for the suction.*

3. *Underneath the handle alignment, drill a hole through both buckets using a door knob drill bit . . . 2-1/8 size.*

4. *Drill the same size hole on the opposite side of both buckets.*

5. *Remove the interior bucket and place the bottom bucket to the side . . . you are finished with the bottom bucket.*

6. *On the interior bucket, drill at least two more holes 90 degrees from the single holes.*

7. *Drill the two holes again on the opposite side of the interior bucket.*

8. *Place #8 wire inside the interior bucket to close up the holes and allow ventilation for the bees. Use duct tape to attach the screen to the inside of the bucket.*

9. *If you use the vacuum often, you can also attach the screen to the inside of the bucket by using Epoxy glue. The Epoxy comes in all types and applications, so be sure and use one that will work with metal and plastic.*

10. *Take a single lid and cut out the center. Put #8 wire on the outside and tape it down. This becomes your vent lid after you vacuum up the bees.*

11. *By turning the interior bucket the suction adjustment hole is closed up, which regulates the force of the suction. Vacuum is sold at major home repair stores.*

12. *You will have to cut off the angle piece located on the underside of the vacuum. This allows the bees to fall directly into the vacuum cage and not hit the angle piece.*

13. *You have to put a small piece of carpet in the vacuum tube in order to minimize the mortality of the bees when they are vacuumed up. One modification could be to replace the vacuum hose with a smooth side hose. I have had very little mortality with bees using the hose provided with the vacuum.*

14. *With very large swarms or cutouts, or very high outside temperature, we will empty the vacuum into a holding bucket. This helps in reducing the mortality rate. We just placed a top bucket onto a bottom bucket and cut areas out for ventilation. Notice the #8 screen taped onto the outside.*

15. *Inside looking down into the double bucket bee holding cage. Notice the bottom of the top bucket cut out and the lid of the bottom bucket cut out. Small bolts used to secure the top bucket to the lid of the bottom bucket. The lid to the bottom bucket was secured onto the bottom bucket.*

16. *Holding bucket laying down and showing the screened areas.*

It's All About Teaching

Ann **Harman**

Sponsoring A Bee School Isn't Hard, But You Need To Plan.

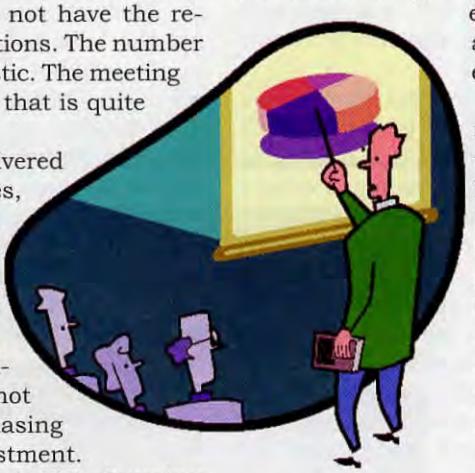
The officers of the East Cupcake Beekeepers Association flipped a page of their 2012 calendars and found that it is now February. Their local extension office had given them names of people interested in becoming beekeepers so it seems that planning some beginning beekeepers classes would be a good idea.

Learning beekeeping on a small scale is still in high demand. All across the U.S. local and state clubs are finding themselves swamped with prospective students. Some have to limit the size of enrollment for various reasons. With such a high demand clubs that perhaps have never planned to have classes are finding out that designing and giving a course would be a good idea.

Now what? Where to start? What to do? How to do it? Who? Calm down. Try very hard to remember what it felt like when you wanted to become a beekeeper. What did you want to know? Where did you find help? Or did you just blunder along learning by endless mistakes?

Many small local associations do not have the resources of large county or state associations. The number of members may be small but enthusiastic. The meeting room may hold at most 50 people but that is quite sufficient.

Today so much information is delivered electronically. People watch TV, Kindles, ipads, iPhones, and computer screens. True, beekeeping information can be delivered that way but beekeeping is really a hands-on activity. Although club members may have computers, the projector necessary for presentations today is an expensive gadget, not normally owned by individuals. Purchasing one by a small club is not a good investment.



Could a projector be borrowed or rented? Perhaps but given the inherent crankiness of computers and projectors (called incompatibility) it may be best to just forget that mode of information delivery.

So let's begin. Perhaps the first decision is how many classes to present. There is a wide range being given now, from a one-day class up to a once-a-week eight-session course. Most of the classes include at least one open-hive day when spring weather permits. Each local association will have to decide what best fits the situation.

Very roughly beekeeping education has two separate parts: one is the bees themselves – their life, habits and problems; the other (the toys) is the equipment for the beekeeper and the bees. The first step in planning a class can be to visit the website **eXtension** (yes, spelled that way). Go to Resource Areas then scroll down to Farm section and click on Bee Health. Wow! If you have not visited this site before you will now be glad you did. Here is a website for bees that can be trusted. In addition you will find the entries to be a good guide in planning a class or a series of classes.

Now that you are in the planning stage, let's stop for a minute and consider whether you will have a fee for the class. That may be influenced by such factors as: does the club have to pay for renting the room; will the students receive a book as a text; will there be handouts that need to be duplicated; and will you be offering coffee or other refreshments? Sometimes having a fee, however small, encourages a commitment on the student's part.

Now for the next question. Who is going to do the teaching? Obviously members of the club. However if a neighboring local association has a member noted for teaching a particular topic then by all means invite that person to be on your program. And should that person receive an honorariam for their effort? Having several teachers, each giving a particular topic, gives good variety and interest to the program. In any club's membership you can find expertise on certain topics.

At this point I would like to make a suggestion. All the teachers need to use correct terms. Beekeeping has its own language. So do other hobbies and pursuits. Sports like football and golf, gardening whether growing orchids or tomatoes, games like chess and poker do too. If you are new to any of these you may well wonder what is going on. Once familiar with the terms then things make sense.

Someone totally unfamiliar with beekeeping may well know "queen" but what's a "super?" Experienced beekeepers tend to toss terms for equipment around rather carelessly, using "box," "super," "brood chamber," (what's "brood?), "hive body," interchangeably. Pity the poor beginner struggling with different teachers using different terms for the same thing. Get together and agree that all who will be teaching use the same *and* correct terms. A one-page handout listing essential terms would be a good idea.

Children learn in several ways and adults do, too. Some are good listeners and take notes. Some learn better visually. The set of 12 Honey Bee Study Prints from Dadant (catalog number M00020 for $24.95) is a quite useful set for a club to own. In addition Brushy Mountain Bee Farm has a Teaching Hive (#291 for $84 or the set of 8 frames only, #291F, for $68). Both of these teaching aids will help the students see what you are talking about.

It may seem to you that anyone knows what "brood"

is when discussing bees. However, I have heard students ask "what is brood?" It's a good question! It may seem to you that "foundation" is a perfectly obvious term. It is not, to a beginner. If you have some members in your club who are first- or second-year beekeepers ask what they found puzzling at first. Use that information as a guide.

Requesting some free catalogs from major equipment suppliers is a must. Actually these help to reinforce beekeeping terms of all kinds since pictures and names help the students to identify and remember terms. But a word of caution. The catalogs have a huge quantity of things and can seem, to a beginner, overwhelming. Are all these necessary? A bit of reassurance is necessary here. Basics first. Play later.

The equipment part of the class can be interactive and give a break from the lecture part. It's the petting zoo of the class. One table can have personal gear – coveralls, jackets, veils, gloves. Ask club members to bring their own for display. Stains and bits of duct tape patches are welcome. Encourage the students to try on the veils. Perhaps a club member or two can be at the table to answer questions.

Another table is for the essential woodenware, smokers and hive tools. Keep in mind that many women may be taking the bee course, as well as retired people. Keeping bees in 8-frame equipment or using mediums as brood chambers should be an important part of the display. Even young people can have back trouble before becoming a beekeeper. The bees don't mind what they live in so encourage the students to use equipment they can handle easily. Yes, have at least two club members at the equipment table and encourage students to handle and ask questions.

Although some in the class just want bees others wish for a crop of honey. If someone in your club happens to have a frame of honey, even one kept in a freezer for emergency bee food, have it part of the display. It always attracts attention. When accompanied by a jar of honey and some little spoons for tasting you'll find the combination a highlight of your class.

Now back to the bee part of the course. As you are planning this part keep in mind that the beginners need the basics. They do not need to know how to raise queens. Eager beginners are dreaming of bathtubs of honey. Let their hopes down gently. Whether from a nuc or from a package the goal is to have the bees live through the first Winter.

One club member can introduce the members of the bee colony and their tasks. You may be speaking to people who are totally unfamiliar with biology. Just mentioning that the workers are female usually brings a stir of surprise followed by laughter. Well, go ahead and laugh with the students. I have found that many people are quite surprised that the queen does not mate with the drones inside the hive. I have listened to a non-beekeeper explain just how bees make honey from pollen. Don't be surprised at strange ideas. Anticipate them. Such small things, quite familiar to beekeepers are eye openers for the students. You will probably find some other facts that surprise your students. Make note of them so you are sure to cover them in next year's class.

Bee plants is a difficult topic to do without pictures of the blossoms. Perhaps someone in the local garden club or Master Gardener group could either supply photos or perhaps give a brief presentation to your class.

Now for the gloomy part – pests and diseases. If your state has inspection services see if an inspector can present this part of the course. Otherwise I am certain your club has an experienced beekeeper who can do an excellent job. The pests and diseases part of the course is the one most susceptible to providing information overload. Characteristics of various diseases, identification of pests, the details of combating *Varroa*, and more. It is very easy to create a "hypochondriac beekeeper" who sees a cell filled with honey as American foulbrood and a visiting spider as the dreaded small hive beetle. Keep the tone of this section more reassuring than threatening. If you have not thought about mentors, now you can see why they are so valuable for beginning beekeepers.

Mentors, used properly and not abused by overuse, are the successful follow-up to your class. Depending on the number of students and the number of mentors, not every student may have one. Students living close to each other can meet as a small group with a mentor at one student's hives. Try encouraging first and second year beekeepers to become apprentice mentors. They will learn a lot. Plan your club's mentoring program when you start planning the course.

Now I want you to remember the three most important words that every teacher must know and use when appropriate: "I don't know." Followed these by three more: "I'll find out."

Remember to smile and show your enjoyment of bees and beekeeping. BC

Ann Harman teaches bee schools and keeps her own bees from her home in Flint Hill, Virginia.

The Observant Beekeeper
Mike Stephanos
Walnut Creek, CA

Judith **Adamson**

Working with bees calms me down. I'm a Type A personality, but since honey bees are definitely an even more energetic Type AA, they actually cause me to slow down. Slowing down makes me pay attention, and I begin to realize the genius in the details of what bees do.

Ever since I was a little boy I've been interested in bees. My family lived in Greece for a few years, and I spent some time on my grandfather's farm. His neighbor had bees, and I watched him work with them.

Years ago, our neighbors down the street here in Walnut Creek had a swarm in front of their house, and an older Swiss gentleman who lived a couple of blocks away came to pick them up. We started chatting about bees, and I said, "Hey, I'd really love to be a beekeeper. I'd like to learn more." I bought a hive from him for $50. It already had a super of honey, so I was instantly able to harvest the honey and extract it at his house.

One colony soon grew to two. When I learn a hobby I jump in with both feet, and because I work at home doing product development I have a schedule that allows me the time to do it. I also found a couple of mentors, Steve Gentry and Major Brunzel. Not only was I was calling my mentors between two and five times a day on different subjects pertaining to bees, I was also harassing the bees by being in their hives morning, noon and evening. Well, you're not really supposed to do that; bees have a tolerance of every couple of days or so. I'm sure I was haranguing them and driving them nuts, but I was just so interested in what they were doing.

I went from two colonies to four rather quickly and then from four to six within two years. I held at 10 for about three years – all in my backyard. Then it just started taking off and before I knew it I had 60 hives. I started selling honey to my local bee club and realized that this was nice a little hobby.

Over the years, people began asking me to put bees in their yard or to teach them about bees. One of the best places I was able to put bees was at the Rossmoor Garden Club. I had been mentoring a beekeeper there, and when he moved, he asked if I wanted to take over his two hives. I met with the club; they were delighted and said I could have as many hives as I wanted. Now I have eleven there. It's a large space adjacent to their extensive flower and vegetable garden, so the bees are a great service for pollinating. Rossmoor is a retirement community, and the residents get a kick out of knowing there are resident bees pollinating their garden. They (the human residents) often come by to visit me when I'm working with the hives.

Bees are under a lot of stress from the environment, so their survival rate isn't anywhere near as great as it used to be. I like to give my bees as much of a natural boost as possible. In fact, I don't like to use conventional medication anymore, but it wasn't like that when I first started.

When I began beekeeping, I basically followed the common rules of beekeeping, which was to use all the medications that most books and catalogs tell you to, to be very proactive and to prophylactically medicate, even though you don't even know if your bees have a disease. You may not have a huge mite problem, but put a miticide in there anyway. In the early days, that's what was done; now I'm firmly against that.

I believe survivor stock is what it comes down to in order to help strengthen local honey bee populations. When you catch a swarm in the wild, they're out there for a reason. They survived without medications, so that's what we call survivor stock. I no longer buy bees from breeders. I don't re-queen with commercially raised queens. I don't buy packaged bees. I only catch and repopulate with swarms. I'm fortunate to catch a lot of swarms here because I'm well known in the area so people call me for swarm removal. Among those who call me are exterminators because they know I keep the bees alive. Not only do I supply myself with bees, I supply kids at the 4-H and other members of our bee club with survivor stock swarms.

We don't really know where those swarms are coming from, but the majority come from holes in trees, walls of houses or upside-down flower pots etc. If they're from another beekeeper who may medicate his hives, you just don't know. In some cases one may find a marked queen, which indicates it is from a managed hive. I prefer to mark my queens because then I know if the queen has been superseded (killed and/or replaced) if I find an unmarked queen in my hive. This is a clear indication that my old

queen has been naturally replaced.

I do what I like to call a Cincinnati Split, which is when you split a very strong colony. Say, after a year or two, I find that one of my colonies is very, very strong and productive, then I know it has great genetics. In fact, they're so strong they'll probably swarm. So I like to pre-empt that swarm and split the hive, hopefully eliminating the swarming instinct for the year.

I take some comb with eggs out, find and isolate the queen in the original hive, and create two hives. I take half of the colony with fresh eggs that the queen has just laid, some larvae, some capped brood and some of the house bees, and I move them to another box.

Soon a virgin queen will be born, fly and mate with multiple drones. We don't know the genetics of those partners, but at least we know the genetic qualities of the new queen. We know then that the new colony should have some quality traits that we have perpetuated from the queen's genetic line. Not only will we have quality strengths, we'll have qualities of good hygiene – cleaning the hive, taking care of the mites and many other issues.

In nature, bees like plenty of space and ventilation; they control the amount of ventilation by filling in little cracks in the hive with propolis. To provide the bees with additional ventilation in the heat of summer, I use screened bottom boards (which is also a useful pest management device). I like propping hive tops, allowing much more ventilation through the hive. I don't want to give them too much space, but I want to give them enough, so I always try to run what's called "two-deep hive bodies" – two lower brood boxes – which give the queen plenty of space to lay eggs and for the worker bees to store adequate pollen and honey. I provide additional space for honey during the nectar flow by adding medium suppers as needed.

I've been very fortunate to be mentored by quite a few veteran beekeepers whom I greatly respect. I've collected their knowledge as much as possible and applied it to what's best for the bees and also to what's convenient for my style of beekeeping. For example, many veteran beekeepers do not use queen excluders in the hive; instead, they allow the queen to move up into the fresh comb of the honey supers. When the nectar flow hits full swing, the worker bees start to put honey up above the brood. This forces the queen slowly down into the lower boxes.

I use queen excluders just because it makes my life a little easier; I do not have to worry about the queen being in the honey super when I harvest. That's me being selfish and saying, "No, you can't go up there, queen, but you can let your worker bees put honey up there for me."

Through the years I've seen how strong hives can fight off ants; if a hive is unable to deal with ants, it's an indication it's weak. I like to give the bees a little boost by going out to gather eucalyptus leaves which ants don't like, dragging them back in a big burlap bag, and sprinkling them around the hive. This is one of many natural ways to fight pests that impact the bees.

In the early days when I only had a few hives I used to paint designs like waves, dots and checkerboards on their front above the entrance of the hive. When several beehives are close together, there's an element of drift that is, bees returning to the wrong hive. If it's a windy day, some bees will drift from one hive to the other by accident. The neighboring hive will accept the random few, but not very many. Bees can recognize shape and tonality, so I painted individual designs on each hive so the bees could recognize and thus help them target their hive more accurately. This is called a "bee address."

There are basically two types of beekeepers. There's the beekeeper and the keeper of bees. A beekeeper is somebody who understands bees, who really gets involved with them. It comes very naturally and intuitively. People who have a technical sense seem to pick up an understanding of bees much more readily than those who are less technical.

Then there's the keeper of bees. I've mentored a couple of people who are very sweet, very kind and extremely interested in bees, but after two or three years, they just don't grasp what's going on in the hive. They can read everything under the sun, and yet it just doesn't connect for them. For those people, just having bees in their life is very fulfilling. They have a hive in the garden and allow the bees to go about life on their own, never getting involved in the technical aspects of beekeeping.

Over the years I've been beekeeping, my style has evolved towards "a less is more" attitude. Bees have been around for a lot longer than we have, so we have to realize that they know what they're doing. I no longer always have to be in the brood boxes. I don't always have to find the queen. I don't have to medicate. I prefer to observe them and let them tell me what's going on. I can know exactly what their health is, what the condition of the hive is, how they're feeling, etc., just by observing from outside the hive. Bees give lots of clues, and a good beekeeper has to be aware of those clues. That comes in time and from patient observation.

This past Summer I was away for three months. The few times I came back, I walked around the hives and looked at all my bees, but I didn't go into the hives. I didn't have to suit up; I just looked at them. I could tell how they were faring by how they were flying, what the entrance looked like, the volume of the bees. I lifted a corner of the hive to feel the weight of the hive to see if they were putting away honey. You can smell if a hive is sick. If they have foul brood it smells like dirty socks. If they have nosema – bee dysentery – it looks like tobacco spit on the front of the hive. By the way they're acting on the front of the stoop, you can tell if they have major mites issue (for ex-

bor 15 years ago, my apiary has grown to more than a hundred hives located all over the county. The bees give me enough honey for my business, Home Town Honey, to supply several health food stores (soon to include Whole Foods), with what I (and many others) consider an exceptional local honey. After the bees Winter over this year, I plan to expand by another 50 to 100 hives. The bees and I must be doing something right. BC

Mike Stephanos is the owner of Home Town Honey in Walnut Creek, CA. 925-260-1503.

Excerpted from Backyard Beekeepers of the Bay Area *by Judith Adamson;* ***www.BackyardBeekeepersBayArea.com.***

ample if there are bees not fully developed). You can tell if you have chalk brood if in the early morning there are mummified bees on the front stoop of the hive.

Honey not only has an amazing taste, but there's no doubt in my mind that it also has beneficial health qualities, even curative powers. On popular television talk shows, one can hear the talk about taking honey from the pantry to the medicine cabinet. I think this is true – and not just because I'm a beekeeper. I think there are other things that we overlook and take for granted in nature that can cure many of our ailments. There's a pendulum that swings, and I think we've gone from the natural perspective to a heavy pharmaceutical. Our bodies are getting so tired of that stuff that we need to look back to the natural and find a balance.

From the one hive I bought impulsively from a neigh-

GLEANINGS

FEBRUARY, 2012 • ALL THE NEWS THAT FITS

CORN SEED TREATMENT KEEPS ON KILLING

Frightening new research shows honey bees are being exposed to deadly neonicotinoid insecticides and several other agricultural pesticides throughout their foraging period. The research, published in the scientific journal PLoS One says extremely high levels of clothianidin and thiamethoxam were found in planter exhaust material produced during the planting of treated maize seed. The work, which could raise new questions about the long-term survival of the honey bee, was conducted by Christian H. Krupke of the Department of Entomology at Purdue University, Brian D. Eitzer of the Department of Analytical Chemistry at the Connecticut Agricultural Experiment Station and Krispn Given of Purdue.

Neonicotinoids are also persistent, offering the potential for a large window of activity. The new report says the half-lives of these compounds in aerobic soil conditions can vary widely, but are best measured in months – 148 - 1,155 days for clothianidin.

Both soil and dandelion flowers obtained from the fields closest to the affected apiary contained clothianidin and this could have resulted from translocation from the soil to the flower, from surface contamination of the flowers from dust, or a combination of these two mechanisms. Dandelion flowers growing far from agricultural areas served as controls and no neonicotinoids were detected.

The results also showed clothianidin present in the surface soil of fields long after treated seed has been planted. "All soil samples we collected contained clothianidin, even in cases where no treated seed had been planted for two growing seasons," the report says.

"Lethal levels of insecticides in pollen are an obvious concern, but sub-lethal levels are also worthy of study as even slight behavioral effects may impact how affected bees carry out important tasks such as brood rearing, orientation and communication." Also potentially important are the three fungicides found in bee-collected pollen samples – trifloxystrobin and azoxystrobin and propiconazole. Azoxystrobin and trifloxystrobin are frequently used in maize seed treatments as protectants and all three are widely applied to maize in North America, even in the absence of disease symptoms. These findings have implications both for honey bees located near these crops year-round, but also for migratory colonies such as almonds and other fruit and nut crops, the report says.

Alan Harman

PHORID FLY KILLING HONEY BEES

A new threat to honey bees and perhaps, a partial explanation for colony collapse disorder has been uncovered at Natural History Museum of Los Angeles County.

Entomologist Dr. Brian Brown says the pest is the tiny but dangerous phorid fly, which may pose an emerging threat to North American beekeeping.

It is the first documentation that the phorid fly Apocephalus borealis, previously known to only parasitize bumble bees, also infects and eventually kills honey bees – by leading them to abandon their hives at night.

Brown, a world authority on phorid flies, has received reports of nighttime bee activity in Los Angeles.

"It seems to be concentrated near the coast, which is where our collecting has also encountered the flies," he says.

Contributors to a report on the research included Andrew Core, Charles Runckel, Jonathan Ivers, Christopher Quock, Travis Siapno, Seraphina DeNault, Joseph DeRisi, and John Hafernik from the San Francisco State University Brown and his colleagues say they have proof that parasitized honey bees show hive abandonment behavior, leaving their hives at night and dying shortly thereafter.

On average, seven days later, up to 13 phorid larvae emerge from each dead bee and pupate away from the bee. Using DNA barcoding, the authors confirmed the phorids that emerged from honey bees and bumble bees were the same species.

The researchers say understanding details of phorid infection may shed light on similar hive abandonment behaviors seen in CCD. Further, knowledge of this parasite could help prevent its spread into regions of the world where naïve hosts may be easily susceptible to attack.

Alan Harman

Display Advertisers

Deep in the Yucatan jungle, the jaguar rules the night. Crimson-butted tarantulas scamper through the forest. There, in the shadow of Mayan temples, in the village of Becan, close by the crossroads town of Xpujil, my cheerful sidekick Marilyn said, "The sign says they sell honey at that house. Let's ask."

A woman of rare beauty answered our knock. (Later, we would learn her name – Yazmin.)

With a touch of Latin drama, and in my best Spanish, I announced, "We have come from the United States of America in search of the beekeeper Juan Gallegos Hernandez!"

She looked as if she had been expecting us, but how could she have been?

"Don Juan?" she said. "He lives next door."

Within minutes we found him. We introduced ourselves. He offered us chairs on the veranda of his general store. We sat, and we talked.

It felt surreal – to drive for hours on empty roads to this most unusual place, to arrive unannounced at a stranger's door, with only a name given to us by someone whose name had in turn been given to us by yet someone else. And then to sit like old friends and talk for hours about honey bees. Just imagine it.

I am not a member of the Elks Club or any Masonic order. But an Elk once told me that he could walk into any Elks Club in the world and be among friends. I've found it much the same belonging to our worldwide Fraternal Order of Beekeepers. You already belong. You need no letter of introduction in a faraway land – only your veil, a smile, and the secret password – *Apis*.

Yazmin joined us on the deck. She mentioned that she'd just returned from Apimondia – the bi-annual international bee meeting – in Buenos Aires. I could hardly believe my ears! Here we were in the middle of the largest remaining tropical wilderness north of the Amazon, and a local beekeeper tells me she's just been to Apimondia?

I wasn't the teacher here. I was the student.

Don Juan is a member of an *ejido*, a uniquely Mexican agricultural cooperative enshrined in the Mexican constitution. His *ejido* – 300 people from 75 families – is dedicated to beekeeping, as are most of the other 84 *ejidos* in the Calakmul region. Their honey goes primarily to Germany.

These Mexican jungle beekeepers have a few problems, Don Juan explained. First, of course, is the Africanization of the local stock. He said the bees with such a bad attitude arrived 22 years ago – about the same time they crossed the Rio Grande. You wonder how this could be. You'd think Africanized bees would have landed in the Yucatan long before they made it to the States, but Mother Nature – and Fate – can be quirky. Maybe the little darlings caught a ride to the border on a truck.

Don Juan regularly re-queens with Italians to keep his mixed race stock civil. But as Marilyn quickly learned, these bees can still be a little testy.

A recent problem facing the Calakmul beekeepers is winter hive dwindling and mortality. The hives tend to be weak when the honey flow begins in earnest in March, and the bees never really catch their stride. Don Juan said half of his hives were in decline as we spoke, in early November.

Tests for *Nosema Ceranae* came back from the lab with alarming spore counts. But because the *ejidos* are in transition to certified organic honey production, application of the Nosema antibiotic Fumadil is not an option. Don Juan said he tried feeding soy pollen supplement as a tonic. The bees ate it, but it didn't seem to help.

Other organic restrictions include a ban on certain hive paints, on oil barriers to keep out marauding ants, and even smoker fuel that might have something man-made in it. He said he couldn't use newspaper to light his smoker-load of organic corn cobs!

"Don't you think this organic thing is going a little overboard?" I asked.

"It's not worth it," he said. "Not for three to five pesos a kilo (15 to 25 cents a pound) more for our honey. But it's what the *ejidos* want."

There is no commercial agriculture in this remote region, much of which is protected wild land. Still, Yazmin noted that Calakmul honey is shipped to Germany along with honey from other parts of the Yucatan, where bees visit GMO soy flowers. This is a problem for those picky Europeans.

Picky? Did I say that? Is the Europeans' aversion to GMO the problem? Or is the problem mankind's insistence on dominating the natural world and altering it forever?

Don Juan removes drone brood for *Varroa* mite control, and if mite levels reach five to eight percent, he treats with thymol or oxalic acid. In the past, he's used Apistan.

He reported that American Foulbrood is not a significant problem.

At one of Don Juan's apiaries, a hive robber's fresh truck tracks stood out fresh in the mud. The thief took eight of Don Juan's best colonies.

Don Juan's Langstroth hives sat off the ground on planks resting on concrete foundations surrounded by concrete water-filled moats – to keep out those pesky ants. "If a blade of grass leans against the hive, the ants will walk across it," he said. "They'll build ant bridges to get to the hive."

We looked at some bad hives and some good ones. The darlings were on a little honey flow.

I wish Don Juan and his *ejido* partners the very best. It's the same the world over. Beekeepers face age-old problems and new ones never dreamed of a generation ago. Good beekeepers struggle to find answers, and somehow, to survive.

Ed **Colby**

Little Darlings – In Mexico

BOTTOM BOARD