Oct 2012

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Bee Culture

The Magazine Of American Beekeeping

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Bees visiting Borage in England. Photo by Simon Croson.

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Subscription Information
U.S., one year, $27.50; two years, $49. Newsstand price: $4.99. All other countries, (U.S. Currency only), $15.00 per year additional for postage. Digital Edition $14.99. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), October, 2012, Volume 140, Issue 10, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

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

Advertising
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800.289.7668, Ext. 3220; Dawn@BeeCulture.com

POSTMASTER: Send address changes to
BEE CULTURE, The A.I. Root Co.,
623 W. Liberty St., Medina, OH 44256

Bee Culture - The Magazine of American Beekeeping is printed with all natural vegetable based ink on post consumer recycled paper. Please recycle this magazine responsibly.

Bee Culture

FEATURES . . .

DEPARTMENTS & COLUMNS

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Where Is Home?

I heard that bees can differentiate between their home hive and a neighboring hive if a shape is painted on the front. I went one step further and painted a different home theme on each of my hives and people have suggested I share the same with your magazine.

I have attached a photo of my beeyard along with a photo showing how the bees that live at "vacation hive" cluster on the dock on warm days. Ironically, vacation hive is my biggest honey producer this year. Go figure.

Thanks and have a great day!

Jan Rogers
Dunstable, MA

Gloom, Doom And Despondency

Recently there have been reports in the national press and on TV about the plight of bees in the UK caused by the bad 'Summer'. According to the experts – staff of the National Bee Unit included – this season looks like being the worst for three decades. It is forecast that honey crops – if any – will be 60% down on an average year.

Last Winter was slightly colder than usual with snow falls and night frosts. In March, we had a very warm spell with temperatures in some areas up to 80°F and this lasted nearly three weeks into the beginning of April. There were reports of one or two swarms and everyone thought that Summer had come. Then the rain and cool temperatures started.

Feeding colonies was very necessary as the warm spell had encouraged the queen to start laying but due to the inclement weather the foragers were unable to get out of the hive. On the odd day that it was possible to open hives, it was obvious that the colonies were well below strength for the time of year and feeding had to continue.

Some beekeepers commented on the dearth of drones and it was thought that the workers had driven them out of the hive because of lack of food. Then there were more reports of queens not laying properly, colonies generally underperforming and being undersize, so feeding continued.

The rains continued causing serious flooding in various parts of the country and the months of April and June turned out – according to the Meteorological Office - to be the wettest ever. In spite of this, hose pipe bans, imposed because of shortage of rain over the last two years, were kept in force, which caused much comment in the press

In addition to the lack of honey bees, there were very few Wasps in evidence – I've only seen two this year. Bumblebees were conspicuous by their absence as were dragonflies and last week whilst gardening I came across a queen bumblebee already hibernating. Shortage of insects is said to the be reason for the decline in some bird populations.

The local bee inspector told me a couple of weeks back that some beekeepers will be lucky to get their bees through our supposed Summer, let alone the Winter. However, some beekeepers have fared better than others.

I have been feeding my colonies right through from April until mid July and have now started again for the Winter feed. Even so, the colonies have not grown significantly in size and some will probably have to be united.

The outcome of all this is that honey will be a scarce commodity and prices are forecast to rise. This will also apply to crops such as wheat and potatoes which are affected by the sodden ground and, again, prices will rise.

Of added concern is the effect that this dreadful Summer will have on next year's bees. Time will tell.

Peter Smith
England

Bee Poisonings & Corn

As a Canadian beekeeper who has been operating an apiary for over 40 years in the province of Ontario, I have closely followed the ongoing problems associated with colony collapse disorder (CCD) that have been occurring recently in the United States. I have also been watching what is happening in Ontario, to see if there are any similar occurrences.

Early this Spring when my buddy Larry, whose beehives are established quite close to mine, phoned one Sunday afternoon to tell me that his bees were coming out of their hives and dying, I was concerned. He asked if there were similar signs of illness around my own hives. I checked mine immediately and was relieved to find no signs of ill bees. On that afternoon, April 8, 2012, I went over to Larry's to see the situation there for myself. Once I arrived, I quickly noticed that Larry's bees were coming out of the hives, moving around on their backs a while in a unusual manner, and then dying.

It was a cool Spring day; there was a chilly wind blowing out of the north and the temperature was around 40°F. Corn had just been planted in a 200 acre field located approximately 300 yards north of Larry's hives.

Although it was warm enough for flight in the sheltered areas, outside of that protection it was too cool and windy. The corn had been planted with a John Deere air seeder on Friday night and on Saturday. When I arrived at Larry's it was Sunday afternoon.

The farmer who had planted the corn near Larry's that weekend was the same farmer who also

rented land beside my own beeyard. The only separation between the field he would plant and my hives was a shelter belt which is 50 feet wide. This farmer worked the land and had initially planned to plant on the evening of April 10th. However, it rained and he could not get on the land the next day. During discussions with this farmer, I discovered that he did not know what was on the seed. It is not required to have a pesticide licence on pretreated seeds.

On April 12th the seeding began at 8:00 AM in the field near my hives. There was a frost that morning and the temperature was around freezing. Bees are not able to maintain flight at that temperature. Within an hour and a half of the start of the seeding process bees were starting to come out of my hives and die. They had similar symptoms to Larry's dead bees. More than 200 bees, including drones, started dying every day in the hives with their tongues sticking out.

On Sunday, April 15th, there was a smell like chlorine in the air outside and it was raining. It was not an ozone smell, like the one that occurs naturally after a thunder storm, but rather a harsh chemical odor. In a period of 25 minutes, there were 40 newly dead bees on a carpet in front of the hive I was observing. Incidentally, there were over 100 hives in my yard then, because it was a wintering yard. I used it for queen rearing and nuc sales. This high mortality rate worsened as the Spring passed. For example, on April 20th there were between 200 and 300 dropped bees in my traps over a 24 hour period. I was also finding dead drones and drone pupas in the screened traps during the middle of April. Bees like to keep a clean hive and clean out the dying pupa.

The morning of April 25th was once again cold and wet and my fear of widespread contamination of the hives was increasing from seeing all the dead and dying bees. The bees were still dying in vast numbers and at 10:00 a.m. the bee inspector came from Wingham to my property in order to collect a dead robin that I had found beside a hive. I still was concerned with the situation. On April 30th it was raining and there was a heavy die off of bees showing in my hives. By May12th honey and pollen were coming in and I was wondering about the contamination of the pollen and nectar. I was wondering if other animal species in the vicinity were being affected. About a week after the robin, a flycatcher was found dead in the middle of the yard. Bird droppings were observed on the traps, it would indicate they were feeding on the dead bees. I also observed a mouse that would daily run along in front of the same hives. It appeared that the mouse to be feeding of the dead bees.

In nature, the strongest animals always prey on the weakest; therefore, dying bees around their

hives are a sizable feast for any local wildlife that eats insects. I also observed that ants were carrying away dead bees. On observing the brood patterns at this time, I noticed that they had a shotgun appearance instead of a normal solid pattern. In raising queens it was difficult getting grafts to take for queen cells and only 30 percent did take, whereas in previous years, 90 percent on average would have been drawn and capped. It would appear that the royal jelly that feeds the queen larva was contaminated. Furthermore, virgins were also dying in the cells after capping and there was a low acceptance in the mini mating nucs. I am thankful that we had a back-up yard with breeder queens in another isolated location in a forested area. I was able to move our operation to that secondary location; otherwise, the increasing death toll of bees would have been totally disastrous to my business.

Beekeepers, like other professionals and agricultural workers, need to be vigilant and to communicate with others in the same field so as to be alert to what going on in our industry.

Throughout the Spring, Larry informed me of what was happening to his hives and I also talked to other beekeepers. Most people I spoke with stated that they hoped it was an isolated case, but what started for me with a few sick bees at Larry's was revealed to be a much larger and more urgent crisis. Over 150 beeyards (in Ontario) reported similar problems to my own. Some other beekeepers have claimed to have bee deaths too, but will not publicly share the location of their bee hives. The Ontario Ministry of the Environment and the Pest Management Regulatory Agency in Ontario were notified; both groups have been helpful as they became involved in this situation.

Since my involvement and research into this problem of bee deaths began, I have had an interview with the Environmental Protection Agency (EPA) in the United States to discuss the problem. After this interview, three beekeepers, including myself went to Ottawa, for the Standing Committee of Agriculture and Agri-food's meeting in June. We were witnesses of what had happened and the details of the meeting can be found on the official website of the Government of Canada.

An estimated 40 to 50 percent of all my bees died. No hive died completely here, but such a high mortality rate warrants investigation. I observed dead queens in the traps and Larry reported excessive swarming after many deaths had occurred. Such behaviour is not only damaging to apiaries, but it is also an indicator of many health problems for the bees.

The common factor with these dying bees is that they were all in close proximity to recently planted corn. The corn had been treated with insecticides that the farmers themselves did not fully understand, but these chemicals nevertheless have devastating consequences for the surrounding area.

For example, Clothianidin is the active ingredient in the treatment of this corn which is planted. I see it as the cause of all these early bee deaths. In Ontario 28 out of 36 samples tested positive for Clothianidin this Spring. It is an insecticide that is manufactured from neonicotinoids, which are the base component of more than 20 different pesticides. The EPA acknowledges that Clothianidin is a threat to honey bees, even though they are considered non target insects along with many other insects. Clothianidin may not have been developed to destroy bees, yet it can still harm them and kill them, regardless of its original purpose. Purdue University, in Indiana, has also studied this particular insecticide and there is a video produced by the university which shows the horrific effects of it.

Many pharmaceutical or agricultural problems have scientists and researchers working on both sides of the issue. One side wants to protect the environment and ensure the safety of human beings and other animals, while the other side has a vested interest in protecting the monetary profits of large corporations. These recent bee deaths are no exception; some researchers are intent on defending Bayer AG's creation of Clothianidin. Their actions are muddying the waters of every formal discussion.

In conclusion, there were very low mite counts this Spring and low nosema counts in Ontario. Most beekeepers, including me, were well below a 10 percent loss this Spring according to OAFRA before the corn was planted. All the bee deaths occurred shortly after corn was seeded near their hives. When I and five other beekeepers rationally voiced our concern, Bayer admitted to us that there was a problem with the delivery system and were looking into it. Merely an internal investigation is not sufficient. These beekeepers need compensation for the loss of their bees and the loss of income. I too am seeking compensation for my losses. I am also seeking answers.

I want to know how such a poisonous substance is still being distributed to farmers. These chemicals kill honey bees. What about negative effects on human beings? What harmful poisons are we ingesting and inhaling ourselves? We are part of the same food chain and we share the same habitat as honey bees. What about the prolonged exposure to neonicotinoids has to human health? This problem is not being dealt with as quickly as it should. The use of Clothianidin ought to be illegal. Research has shown this chemical causes Alzheimer like dementia

in bees so what will it do to us as humans? Other European countries have banned this product.

Bill Ferguson
Hensall, ON

We Like The Label

I'm writing in response to your August issue comment concerning the new peel off address labels. I think this is a wonderful idea because I am an artist and love to draw and paint the pictures on the covers. Being able to remove the label is great.

Also, old issues of *Bee Culture* Magazine are very collectible. I most recently paid $37 on EBay for an old issue of *BC* to add to my incomplete collection.

Collectors will pay about 60% more for old issues with unblemished covers.

On another note, I also receive a subscription to another magazine – *Countryside*. Every January issue they include an index which lists the previous year's articles by topic. This is a wonderful tool when trying to find past articles. Would you please consider the possibility of incorporating this feature into your magazine? It would be an invaluable reference tool for all of us.

Scott Withrow
Mt. View Honey

***Editor's Note**: We've heard many positive comments about the new label. We're glad you like it. As for the index idea, we've been doing that forever. It is in the December issue each year – listed by title and by author.*

More Marijuana Honey

Upon reading one of the mailbox letters in the August issue it brought back a memory that happened over 30 years ago.

I had stopped at my favorite "watering hole" tavern for a cool beer. I also had a case of one-pound honey jars in my rig. After some casual conversation one of my friends said he wanted to buy some honey, so I went to the truck and brought the whole case in. I had noticed a number of young adults with baseball uniforms on drinking a pitcher of beer. They were on a Slow Pitch team. One of them came to the bar and ordered another pitcher. He spied the case of honey and asked me about it. I told him what it was. He responded that he didn't like honey, but his dad did. I suggested he buy one for his dad. He said he didn't like his dad. So much for that deal.

I had just finished my schooner and was hit with a bright idea as I looked around. Like I didn't want anyone to hear I softly said that this isn't "regular" honey. He had a look of interest, so I proceeded and said I discovered a large pot growing place, up country, hidden inside a cornfield. This was all a lie. Anyway, I told him my bees went crazy collecting nectar from this pot. In fact they worked all day and night. The comb they build was eight-sided instead of six and the pollen was arranged in a psychedelic pattern. It was amazing. The guy bought one. I watched as he was telling his buddies about the honey. They all stuck a finger in the jar for a taste. Pretty quick they ignored the pitcher and were really going after the honey, laughing and acting kinda goofy. Two of them came over and bought the rest of the case. They all left soon after and I noticed the pitcher of beer was still full.

It's strange how the mind works. The honey was mostly from a tree only found in the Pacific Northwest called Cascava, a member of the Buckthorn family. It's bark is peeled and used for a laxative. The honey is said to be slightly laxative.

Jim Cowan
Aberdeen, WA

Carpenter Bees

With the drought this year in Southern Illinois, along comes swarms of Carpenter bees. We have always thought the few we saw were bumblebees and I did nothing to stop them. This month we have noticed our salvia and veronica literally covered with what we thought was young bumblebees, I finally got curious and found the right web site to get a better id on these thieves. They were running the honey bees off our bee garden entirely. I decided to vacuum them off just like catching a swarm. Just used a small shop vac. I have the five-gallon bucket with vacuum attached, designed for swarm catching. Every time I had used this swarm catcher, my bees died before I could get them home, sometimes in 15 minutes time. This will be just the thing for the Carpenters. I live in a log house and don't like their way of remodeling.

Dick Largen
Bethalto, IL

What's New This Month –

We were approached by a manufacturer in Pakistan who makes beekeeping protection gear – primarily gloves but also veils. They make all manner of gloves but their prices – when buying hundreds – is relatively inexpensive. What got our attention however, was the one style of veil they made and we had them send one. Somewhat reminiscent of the veil worn in the movie *The Secret Life Of The Bees*, it seemed, from the photo, to be unique. Well, it is. It is made, we believe to have the bottom worn under a shirt with a collar because the back of the neck is exposed when bending over and a shirt would solve that. The view, from the odd shaped screen is interesting. It would do well under the truck seat when a quick inspection is needed or in a situation where something to keep bees out of your hair when working with a lot of flying bees is needed. The gloves, which they specialize in are well made, soft, with a short gauntlet.

For more info, Nazir Alam & Son, P. O. Box 452, Sialkot, Pakistan. **http://www.alamsons.com/**

New CLEAR Honey Label from Brushy Mountain. Simple design doesn't distract from your honey, and extra space at the bottom allows for custom printing for name, address, weight or varietal information. Clear white label out soon.

Call 800.233.7929 for pricing and printing information.

Top-Bar Hive Beekeeping: Wisdom and Pleasure Combined. Wyatt Mangum. 8.5" x 11", 421 pages, almost 400 photos (mostly color, some infrared night shots). ISBN 978-0-9851284-0-1. Available only from www.tbhsbywam.com, $45.00 plus postage.

If you're not familiar with Wyatt's writing, he's been a regular columnist in *The American Bee Journal* for years, covering honey bee science, history and management. He has degrees in physics, math and genetics, and has been keeping bees for more than 40 years, and in top-bar hives for a quarter century. He knows his stuff. And his stuff is all about top-bar hives. And this book proves it.

Actually, this book is really about honey bees and how to keep them. It's honey bee science, honey bee management, honey bee equipment, harvesting honey, pollinating as a business, making nucs, raising queens, managing a colony, dealing with pests of every kind, repairing equipment, observation hives, wintering, hive stands, mice, frame management, repairing hives, shaking packages, and even pollen traps.

Did I mention that Wyatt uses top-bar hives for all this? Little ones, only two feet long and long ones, five feet long. TBHs made of sunflower stalks and all manner of kinds of wood. He makes feeders and queen introduction cages and screened bottom boards. He mass produces these things. He talks about swarming, and swarm cells...on the sides of the comb, not the bottom by the way. He deals with small hive beetles and *Varroa* and marketing cut comb honey and making straight comb and fixing crooked comb... everything frame hive beekeepers do, and some they can't do. There's 12 chapters, a good index, four good appendices, and solid, beekeeping information. With top bars and honey bees.

Kim Flottum

INNER COVER

I think every business that deals with customers makes claims about their superior customer service. TV commercials, radio announcements, newspaper ads... they shout it from the rooftops. And, for the most part most do an average job of taking care of disgruntled customers who have been, or think they have been ripped off, ignored, cheated, lied to, looked down on or any of a thousand reasons people feel some business has not earned the money they were given for a product or service, kept a promise they made or somehow took 'advantage of me.'

And businesses screw up, routinely. Businesses are, after all, only people. Buildings and machines and products don't screw up – the people who build them, run them or sell them do – it's the old guns don't kill people, people kill people argument. Which, by the way, nobody ever wins.

Heck, we make claims about superior customer service here all the time. You got a problem with your subscription, a book you bought or something we published – we'll make sure you get taken care of – if you're right, we're wrong, or an Act Of God made it happen. I don't know about other businesses but we can't afford to tick off anybody . . . there just aren't that many beekeepers out there to replace anybody who up and quits. So we try to do what we need to do to keep most of you happy most of the time. And as a plug for our superior customer service, if you got a problem send me an email, write a letter or give us a call – we'll do what we can to fix it.

But it's that size thing that gets in the way of good customer service sometimes. Often, it seems, the bigger the company the worse the service. It's hard to yell at a form email, or a mechanized phone call, or a form letter they sent explaining why it wasn't their fault. And you're not getting your money back because we did everything we said we'd do, no matter what you think. Didn't you read the fine print disclaimer at the bottom? You know fine print – the big print at the top of the letter gives – the fine print at the bottom takes it away.

Here's one of those instances that's probably no one's fault, but a very big company simply didn't care.

We were gone for eight days attending the Eastern Apiculture meeting in Vermont. A great meeting, good people, lots of fun, but it's time to get home. We arrived back late Saturday night, carried all the stuff in that needed to be in and were ready to get something to drink, sit, relax and get ready for a week of catch up. Open the freezer door for ice – the ice is water, the smell is – ummmm – interesting, but not gross. It takes a moment – what's wrong here, this should be ice, not water – did the knob get bumped, the temperature turned down?

So I checked the bottom. Big mistake. Slam the door shut, get garbage bags, shovel it in as fast as we can and get it outside, gagging all the way – the bottom was ugly. Milk, meat, cheese – I don't know how long the cooling system was out but the inside was room temperature, actually warmer than warm room temperature from all that fermentation going on I suppose. So how long does that take? Darn, now what?

But this refrigerator is over 25 years old after all. No wonder they call them durable goods. I figure it cost me about $20 a year, not including the power it used. I got my money's worth, for sure.

Sunday. Off to work to catch up on a week old pile of stuff, but later, to a couple of places that sell refrigerators. The first one has a good brand, good price, but can't deliver until Thursday. The second, basically the same except they can deliver on Wednesday. It's a no brainer even though the second place charged for the delivery – I mean, how long can you exist without cold beer during a long hot summer? Wednesday it is. We'll call on Tuesday and give you a window of time that we'll be there, they said all smiles and sign here. And sure enough they called on Tuesday – between 2:00 p.m. and 5:00 p.m. tomorrow they said.

So I'm home on Wednesday, long before 2:00 p.m., just in case they had a cancellation or something. Nope. Not 2, not 3, not 4, not 5, not 6, but at 7 they called again.

"We're running late, they said (no kidding), but we'll be there at 8," they said. OK – so where am I gonna go that late anyway?

Customer Service. The Label Is The Law.

You know the story – at 9 they called again and said – sorry, not tonight, big problem, lots of steps, too small a door – yadda, yadda, yadda. Oh, and I have to call and reschedule. So what they do is, they take that truck back to the warehouse with my fridge on it, take it off and load up tomorrow's deliveries rather than leave it on and make me the first delivery tomorrow – nope, can't do that. So I call again to schedule and the mechanized delivery voice tells me Friday, and we'll call on Thursday to give you a window on the delivery time.

You might not know this part of the story – it's a plot twist even I didn't expect. They email me on Thursday and say – are you ready – your merchandise arrived damaged, and we can't replace it until Saturday. So, did they drop it unloading it back at the warehouse on Wednesday night or what? Or, and the evil side of me thinks, they never had it on the truck in the first place, and never intended to deliver this thing until Saturday anyway, but tell them Wednesday and get them to sign and get them out of here. Oh, but please call and reschedule. Sometimes my mind goes places that scare me a little.

The mechanized voices I'm hearing now don't know what happened, but please have someone 18 years old or older at the delivery location between 11 and 1 on Saturday so they can sign for delivery. The actual day they intended to deliver this thing in the first place (I'm thinking with serious delusions of evil). Someone reading this who works for Sears probably knows that it wasn't that way at all, and it was an honest mistake, and we don't do it that way because we care about our customers. Really. Usually.

A very, very hot Thursday and Friday without iced tea or cold beer.

Saturday. Someone calls. We'll be there in a half hour. They were. They remove the dead machine and replace it with a new machine and hook it up and get it set and sign here and thank you and have a nice day. I gave them each a jar of honey. This wasn't their fault (I don't think), and since I have a hive on the porch they had to walk by when they carried the old one out and the new one in, and the young guy was creeped out beyond imagination, and wasn't having a good time at all, but did like honey, so I thought I'd share. Strange how that works.

So we sent an email to Sears Customer Service at the address it said to send an email to if there was a problem and told them all the problems we had with the paid-for delivery and perhaps they could refund at least our delivery fee for all the grief they put us through, the days wasted waiting and all the errors and mistakes they made. And their mechanized customer service sent back a form email that said they appreciated our frustration with this and thank you for shopping Sears. Yes, indeed. For the very, very last time. I am the worst customer there is...I don't get mad, I just never, ever go back. Oh, and I get to tell people about customer service.

•

The interview this month with Vaughn Bryant is especially timely...actually we planned it that way...considering the attention that labeling honey is getting. And labels may begin incorporating all manner of things we've never considered before. And herein lies all manner of controversy.

You know about the lawsuits on labeling the stuff in a jar of Pure Honey. In fact, the current laws in several states say that if it's honey, it's got pollen in it, because that's the way the bees made it. And if you're a honey packer and your been-using-it-for-50-years process took that pollen out...micro-filtered, ultra-filtered, diatomaceous earth filtered or simply wished it away you better know that somebody, somewhere is coming after you with a microscope, a lawyer, and a vengeance.

But wait. There's more. What about the imported stuff? Gotta have pollen in it or it isn't honey. And it better be the right pollen, and here's the kicker, in the right proportions or it's going to end up in somebody's sewer. It used to be that if you had some of that ultra-filtered, or even micro-filtered stuff and you mixed in, say about half the volume of clover or soy or whatever from this side of the ocean you'd probably get away with it...if anybody even bothered to look...yup, that's clover pollen, just like the label says. But noooooo, not anymore. Say goodbye to fooled-you-more-than-once honey from some of those countries that no more have a beekeeping industry than I do, but do have a real good relabeling industry.

The days of dodging the tariff are nearing, well, I was going to say an end, but we all know that's not going to happen, but at least most of the holes are being plugged and there's more of that ocean of crap outside the gates than there is inside. At least for a bit. And pollen has played a role in this.

So, what about pollen here? People wiser than I have made some suggestions. It seems that without pollen identification the source of the honey is, well, questionable at best, and outright fraud at worst. So what can those companies do that routinely process their honey so that the pollen is removed because that's what their customers want? And mostly it's the grocery store shelf honey that shouldn't crystalize, which, by the way, isn't the biggest market for honey in the long run.

But let's look at those jars for a minute. What if...just what if there was a label on that grocery store bottle that said something like...

This honey sourced from XXXX Company from "Country", lot no. MMMM, with pollen analysis previous to filtering to prevent granulation.

This would mean that, indeed, this honey had been examined, found to have the appropriate pollen, and then micro-filtered to remove the pollen to keep it from granulation. I know, I know, some of these folks would make the copy small and black and impossible to find on the jar. But many wouldn't, I think. The effects of the True Source Honey pledges are beginning to work. That, and the heavy arm of the law is scaring some of the rest into compliance.

And your jar? Right there on the label, in 50 point type, it would just scream...

PRODUCT OF THE U. S. UNHEATED, UNFILTERED, CONTAINS POLLEN

And, I imagine, there'd be some in between...

This Honey Sourced from XXXX Company, a blend from Argentina, Canada and the U. S., unheated, unfiltered and contains pollen.

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A Closer Look

SWARM BEHAVIOR

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

The average swarm contains 75% of the original colony population.

Swarming is a process of colony fission whereby about one-half of the colony workers, with the old queen, leave their old nest site in search of a new one, thus accomplishing reproduction at the colony level. Little is known about the physiological changes in workers that are preparing to swarm. Zeng et al. (2005) determined the endocrine status of worker honey bees in pre-swarming colonies and in normal (non-swarming colonies). Juvenile hormone (JH) titers in worker bees were similar in both groups before queen cells were present, but they became significantly lower in pre-swarming colonies compared with normal colonies when queen cells occurred in pre-swarming colonies. The lower JH titers in the pre-swarming colonies suggest that behavioral development is delayed in these colonies, which is consistent with previous reports that pre-swarming colonies have reduced foraging activities.

When a colony is ready to swarm, a small majority of well-informed individuals, the nest-site scouts, trigger the swarm's sudden exodus from the parental nest (Rangel and Seeley 2008; Rangel et al. 2010). During fissioning, workers might nepotistically choose between serving a young (sister) queen or the old (mother) queen, preferring the former if she is a full-sister but the latter if the young queen is only a half-sister. Rangel et al. (2009) examined three honey bee colonies that swarmed, and performed paternity analyses on the young (immature) queens and samples of workers who either stayed with the young queens in the nest or left with the mother queen in the swarm. For each colony, they checked whether patrilines represented by immature queens had higher proportions of staying workers than patrilines not represented by immature queens. No evidence of intracolonial nepotism during colony fissioning was found. Honey bee workers are not more likely to stay in the nest rather than to leave in the swarm if at least one full-sister is being reared as a young queen prior to swarming.

After leaving the parental nest to start a new colony, a swarm of honey bees hangs from a tree branch in a beard-like cluster for several hours or several days as it undergoes a complex house hunting process (Seeley 2010). While the scouts are busy choosing a suitable nesting cavity, the other 95% of the bees in a swarm remain quiescent and conserve the swarm's energy reserve: the 30-40 mg of concentrated sugar solution carried inside each bee (Combs 1972). During this time, a swarm performs thermoregulation, maintaining its cluster-core temperature at 34-36°C and its cluster-mantle (periphery) temperature above 15°C (Heinrich 1981). A swarm maintains these elevated temperatures mostly by reducing its heat loss rather than raising its heat production, thereby conserving its energy supply.

From the swarm cluster, scout bees continue to engage in the house-hunting process. House hunting occurs in two stages: 1) nest-site selection, during which scouts investigate and recruit for potential nest cavities, ultimately resulting in the selection of a new nest site, and 2) liftoff preparations, during which the swarm prepares to become airborne and move en masse

"While the scouts are busy choosing a suitable nesting cavity, the other 95% of the bees in a swarm remain quiescent and conserve the swarm's energy reserve."

to the chosen site (Donahoe et al. 2003; Seeley and Visscher 2003; Seeley et al. 2006; Seeley 2010). Nest-site selection and swarm liftoff are orchestrated by at least four different communication signals: the waggle dance, worker piping, the buzz-run, and the vibration signal (sometimes called the shaking signal), (Nieh 1998; Seeley et al. 1998).

Initially, scouts independently find and perform waggle dances for a number of different sites. These dances are performed on the swarm surface and communicate the location of nest cavities of acceptable quality (Seeley and Buhrman 2001; Seeley 2010). Over time dancing becomes increasingly concentrated on one particular site, until virtually all nest-site dancers are communicating the location of the same cavity. This 'consensus dancing' is focused on the new cavity to which the swarm will relocate, which is usually the best quality site from among those investigated (Seeley and Buhrman 1999, 2001; Seeley 2010).

During the nest-site selection component of house hunting, the vibration signal exerts a non-specific influence that may enhance scouting and recruitment in a general manner, and is not associated with recruitment for particular sites. No strong evidence was found that vibration signal performance was influenced by nest-site quality (Gilbert et al. 2011). Approximately 14% of the total nest-site scouts produced vibration signals when returning to the swarms, which is similar to the percentage of vibrating scouts previously reported by Visscher et al. (1999) and Lewis and Schneider (2000). Scout bees that investigated the higher- and lower-quality nest boxes did not differ in their tendency to produce vibration signals when returning to the swarms or to perform both vibration signals and recruitment dances for the nest boxes. In contrast, the high-quality boxes elicited three times as much recruitment dancing, although none was selected as the new nest site by the swarms. Thus the scouts clearly discriminated between the two nest-box types, but these assessments did not affect vibration signal production, either when examining the total scouts visiting the nest boxes or only those that also performed recruitment dances. Similarly, Schneider et al. (1998) found that waggle dancers for chosen and non-chosen nest sites did not differ in their tendency to perform vibration signals. Taken together, these results suggest that a relatively small proportion of nest-site scouts vibrate on swarms and signal production is not associated with higher-quality sites, either when recruiting specifically for the chosen site or for non-chosen sites that vary in quality.

As soon as the scout bees have chosen a new home, the swarm raises the mantle temperature to the core temperature, about 35°C (Heinrich 1981), which is the temperature required for rapid flight (Heinrich 1979). Once the mantle bees reach this high temperature, the thousands of bees in the swarm launch into flight, form a cloud of swirling bees, and begin moving together to their new homesite (Seeley and Tautz 2001).

Once the new nest-site has been selected, some of the dancers for the chosen site begin to produce a piping signal, which consists of a high-pitched pulsed sound produced by workers when pressing their bodies against the substrate or another bee (Seeley and Visscher 2003; Visscher and Seeley 2007). This worker piping, previously reported only in hives, was observed in swarms as they prepared to liftoff to fly to a new home (Seeley and Tautz 2001). Pipers are excited bees which scramble through the swarm cluster, pausing every second or so to emit a pipe. Each pipe consist of a sound pulse which lasts 0.82 ±0.43 seconds and rises in fundamental frequency from 100-200 Hz to 200-250 Hz. Many, if not all, of the pipers are nest-site scouts. The scouts pipe when it is time to stimulate the non-scouts to warm themselves to a flight ready temperature (35°C) in preparation for liftoff. The time-course of worker piping matches that of swarm warming; both start at a low level, about an hour before liftoff, and both build to a climax at liftoff. When Seeley and Tautz (2001) excluded pipers from bees hanging in the cool, outermost layer of a swarm cluster, they found that these bees did not warm up. The form of worker piping that they studied in swarms differs from the form of worker piping that others have studied in hives. The two forms of piping are called "wings-together piping" (in swarms) and "wings-apart piping" (in hives).

Another one of the underlying mechanisms associated with a swarm cluster liftoff is the signal called buzz running (Schwirrlaufen). During the final 10 or more minutes before liftoff, excited bees force their way through the quiet bees in the cluster, running about in a zig-zag pattern, butting into the other bees, and buzzing their wings every second or so (Seeley and Tautz 2001; Esch 1967). Many, perhaps most, of these buzz runners are scout bees and their actions appear to loosen up the cluster (Seeley et al. 1979). Seeley and Tautz (2001)

reported that Martin (1963) demonstrated that only bees directly contacted by buzz runners will join the mass exodus when a swarm initially leaves the parental nest. Hence, it seems clear that buzz running plays a critical role in liftoff, probably triggering the final breakup of the cluster. Buzz running is evidently not the whole story, however, because buzz runners appear only in the last few minutes before liftoff, whereas the rise in a swarm's temperature starts an hour or so before liftoff (Heinrich 1981). A second signal that might inform the relatively cool and quiescent bees in a swarm that it is time to warm themselves for liftoff is the shaking signal (sometimes called the vibration signal. To produce this signal, one bee grasps another and shakes this bee's body one to two seconds at 16-18 Hz. There is strong evidence that the shaking signal acts as a modulatory signal that produces a general activation of worker bees in swarms (Visscher et al. 1999; Lewis and Schneider 2000) and in hives (Schneider et al. 1986; Nieh 1998; Seeley et al. 1998). However, because the warm-up period does not occur solely or even principally in the last hour before liftoff, it seems that the shaking signal is not the warm-up signal.

"Less than 25% of swarms survive the first Winter in temperate regions."

After the swarm has moved into its new dwelling place, the workers immediately begin to build combs, which are needed for the new colony's brood production and food storage. Thus, while the colony headed by the mother queen ("mother-queen colony") needs to build a new nest from the ground up, the colony headed by the daughter queen ("daughter-queen colony") inherits an abundance of resources in the parental nest, including a full set of combs, much developing brood, and often sizable stores of food. Given the marked asymmetry in the resources possessed by mother-queen and daughter-queen colonies, Rangel and Seeley (2012) expected that a fissioning colony will need to devote a large fraction of its workforce to the swarm, so that the swarm will have greater than 50 percent of the swarm fraction.

There is little quantitative information about swarm fraction size and about how swarm fraction size affects the growth and survival of mother-queen and daughter-queen colonies. Rangel and Seeley (2012) measured a) the size of the swarm fraction in naturally fissioning colonies, b) the growth and survival of mother-queen colonies as a function of swarm size, and c) the growth and survival of mother-queen and daughter-queen colonies as a function of the swarm fraction. They found the average swarm fraction to contain 75 percent of the original colony population. A significant positive effect of swarm size and swarm fraction on the growth (i.e., comb built, brood produced, food stored, and weight gained) and survival of mother-queen colonies was found. No effect of swarm fraction on the survival of the daughter-queen colonies occurred. Evidently, a honey bee colony must

devote a large majority of its workforce to a swarm so that the mother-queen colony can grow sufficiently rapidly to survive the first Winter. In temperate regions, only 8-24% of mother-queen colonies survive their first Winter, whereas 45-78% of daughter-queen colonies do so (Seeley 1978; Morales 1986). These data suggest that the larger the swarm fraction, and thus the larger the swarm size, the higher the mother queen colony's chances of surviving to the following Summer. BC

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Varroa Mite Reproductive Biology

Zachary **Huang**

A Review Of The Factors Affecting Reproduction And Life Cycle

The *Varroa* mite (*Varroa destructor* Anderson and Trueman) is an ecto-parasite of the Western honey bee (*Apis mellifera*) and is distributed worldwide. Because *A. mellifera* colonies almost always die within two to three years after mite infestation, if not treated, feral bee colonies (unmanaged colonies in the wild) in U.S. were almost totally wiped out by this mite around 1995, less than a decade after it was introduced to the U.S. (around 1987). There is anecdotal evidence that honey bees might be becoming feral again in recent years (resistant genetics possibly leaking out due to swarming), but there is no systematic study proving this. Unless otherwise noted, throughout this paper I will use "*Varroa*", "*Varroa* mite" or the generic "mite" interchangeably to refer to *V. destructor*. The *Varroa* mite is currently the most severe pest of managed honey bees worldwide. Understanding the *Varroa* mite's reproductive biology will therefore allow us to better manage this important pest.

The Life Cycle of *Varroa*

Varroa mite life cycle has two stages (Fig. 1). During the **phoretic stage**, mites ride on adult workers or drones, at the same time feeding on blood (hemolymph) from bees, usually from the inter-segmental membrane on the abdomen. The phoretic stage lasts about five to 11 days when there is brood in the colony. Of course, mites are forced to remain phoretic if there is no brood, and this can last five to six months in cold climates. Mites change hosts (hop from one bee to another) often and this contributes to transmission of various viruses, by picking them up from one bee and inject to another during feeding. Mites experience higher mortality during the phoretic stage, because they make mistakes and fall to the ground below if a hive has a screened or open bottom. Or, they get bitten by workers during grooming, or may die due to old age. The "natural drop" on a screened bottom board reflects a combination of all of these factors. However, the total of these fallen mites is less than 20% of the population. Therefore, using a screened bottom board alone will reduce, but not eliminate chemical use for *Varroa* management. The phoretic stage is important for mites so they can transfer horizontally to other colonies by drifting foragers, or be accidentally dropped onto flowers and then picked up by other foragers (this probably does happen, but we do not know the actual probability), be transferred during a robbing incident. In the last situation, we are actually selecting for mites with high virulence, because while in a natural forest, mites that kill a colony will also die with their host (due to the low likelihood of being found by a neighboring colony), while in an apiary this robbing behavior is guaranteed, insuring the successful transfer of mites from the dying colony to another, where it will repeat the cycle again.

The other stage is the **reproductive stage**, when it is possible for mites to increase their population. This occurs only under a capped brood cell. Mature female mites are already mated when they emerge from the cell with the bee so she is ready to lay eggs. To begin egg laying a *Varroa* mite invades a host (worker or drone larva) cell just prior to the cell being capped. Once inside, she will hide in the brood food in an upside-down position (viewed from the top of the cell). Mites have special appendages called "peretrimes" essentially a snorkeling tube, that helps them breathe. Almost immediately after a cell is capped the larva inside spins a cocoon, becoming a prepupa. The mite in the cell with the prepupawill not begin to feed until about five hours after the cell is capped and the cocoon has been spun. The first egg is laid 70 hours after cell capping, fertilized it becomes a male. This is identical to honey bees, as both organisms have what is called the "haplodiploidy" sex-determination mechanism. This is where males are haploid (having no father) and females are diploid (having both parents). After the first egg, approximately every 30 hours the mite lays a fertilized female egg. If the mother mite was not mated properly, then all of her offspring will be males. A total of five (on worker pupae) or six eggs (on drone pupae) can be laid in a capped cell.

However, worker bees emerge about 11 days after capping, and drones 14 days after capping but a daughter mite takes six days to mature so most of these eggs do not have time to develop into adults, (six + 70 hrs delay in egg laying + one day for first egg as male=10 days, leaving only one daughter to mature). The male mites and the unsclerotized (white) female mites, who are not fully developed die shortly after the bee emerges or is uncapped by hygienic bees due to dehydration. Therefore beekeepers generally see only the mature, tanned female mites, but miss most nymph stages and males. Males will mate with a female repeatedly to result in a total of about 35 spermatozoa inside the female spermatheca.

Varroa mites have "fecal sites" on the cell, where they deposit their feces, which are white due to a high

concentration (~95%) of guanine. For some unknown reason, any mite that defecates on the pupa directly are also sterile (Fig. 3).

Methods for Studying Mite Reproduction

There are two methods for studying mite reproduction. The first is simply to survey, uncapping worker or drone cells in colonies and determining the percentage of mites that reproduced (fertility), or the number of offspring (fecundity) of mites. This gives information about what is happening under natural conditions, but the information obtained is limited because nothing is controlled or manipulated.

The second method is to perform manipulations, either on the mites or on the host, then artificially introduce mites into the cells and wait nine to 10 days to determine fertility or fecundity. These frames can be reintroduced into a colony, but that risks removal by bees due to hygienic behavior, or they can be incubated in a laboratory.

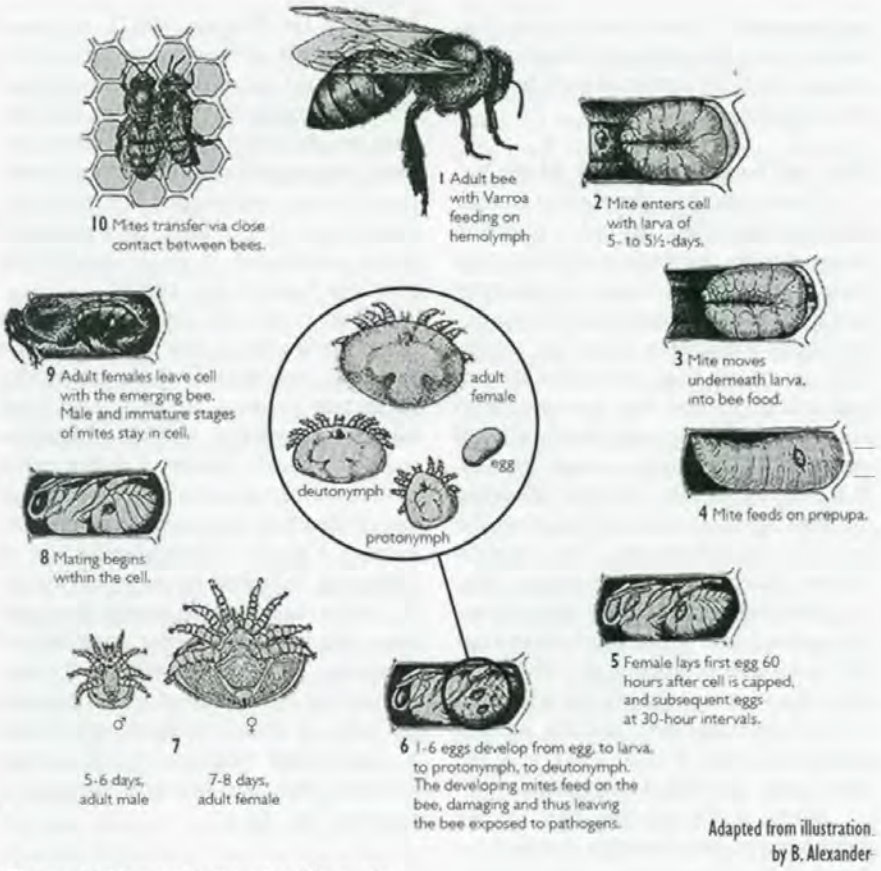

Figure 1. Varroa destructor *life cycle.*

Host Preference During Phoretic Stage

Whether or not *Varroa* mites can choose phoretic hosts was studied previously, using caged bees and petri dishes. *Varroa* mites preferred nurse bees when presented with a choice between foragers and nurse bees. Mites also transferred more often to young bees than to old bees when confronted with freshly frozen young and old bees. This discrimination by *Varroa* was later shown to be related to the repellent effect of geraniol, a component of the Nasonov pheromone, which is high in foragers.

However, it was not clear whether mites show the same preference under a more realistic colony condition. One study showed nurses had a higher percentage of mites than newly emerged bees, but no difference was found between nurses and foragers. Another study found nurses were the most preferred but the experiment was conducted in one colony (i.e. not replicated). My laboratory studied mite distribution among one-day-olds, nurses (five to 11 day old marked bees recovered from a colony) and foragers (unknown age but the average age of foraging bees should be higher than 21 days in a typical colony), and found a clear preference of nurses > day-old-bees > foragers (X. Xie, Z.Y. Huang and Z. Zeng, in

Figure 2. *Mature, immature females and mature males of* Varroa. *Clockwide from top left: mature daughter mite, mother mite, two mature males and an immature (deutonymph) daughter. A younger stage (protonymph) of female is not in this photo.*

Figure 3. *Sterile mites with defecation on bee abdomen. All these six mites did not reproduce and all had defecated on the* Apis cerana *workers. This is also true in* Apis mellifera*: if a mite had defecated on the pupae, she would have no daughters. If she has daughter mites, she would be defecating on the wall.l*

preparation). Thus it ws shown that mites show the same preference for nurses, in both artificial and laboratory setting.

Why Is There A Phoretic Stage?

Scientists were puzzled as to why mites bother to go through a phoretic stage due to the high mortality rate during this period. Under laboratory conditions *Varroa* can reproduce successfully without a phoretic stage. That is, mites that were transferred immediately upon bee emergence to another newly-capped brood cell still reproduced for up to seven cycles. The average number of total offspring (including males) was four during the first four to five cycles. This seemed higher than in our experiment (Fig. 4). However, upon closer inspection, the author said there were mites that did not have offspring (21.7%), and that this was most likely not included in the calculation. So the actual fecundity was 4*(1-0.217) = 3.17, which also included the males.

After subtracting the males (which were about two per mother, instead of one, strangely, in their study, Fig. 4 of De Ruijter, 1987), we have 1.17 female offspring per mother. This would be slightly lower than the 1.6 female offspring per mother that we observed in mites that fed on newly emerged bees. Therefore, mites that do not experience the phoretic stage have lower fertility, especially when compared to those hosted by younger nurses (see below).

Our recent study showed that mites preferred nurse bees, perhaps not only because of their proximity to larvae (nurses inspect and feed larvae frequently), but also because nurses provide phoretic mites extra nutrition for reproduction. We found that mites that were artificially fed on nurses had the highest number of offspring, followed by mites on foragers, with those fed on newly-emerged bees having the lowest number of offspring. In addition, when we compared the fecundity of mites hosted by bees of different ages, we found a significant negative relationship between mite fertility and the age of nurses (Fig. 4).

Differences in Mite Reproduction Important for Resistance Against Mites

Varroa mites reproduce on both the worker and drone brood of *Apis mellifera*, but reproduce exclusively on the drone brood of *A. cerana*, its original host. Many factors, such as grooming behavior (removing mites during phoretic stage from adults), hygienic behavior (removing mites from pupae during reproductive stage), duration of brood state, and attractiveness of brood, contribute to *Varroa* tolerance (reviewed by Büchler, 1994). However, I think that reduced reproduction (including both reduced fertility and fecundity) on worker brood is the most significant factor for honey bee resistance against the *Varroa* mite. This is because *Varroa's* infertility on worker brood correlates well with the degree of tolerance of that bee to the mite. For example, *A. cerana* is highly tolerant to the mite, because mites feeding on worker brood end up 100% infertile. The Africanized bee (*A. mellifera scutellata* AHB) is intermediately tolerant to *Varroa*

mites, and mites feeding on AHB end up being 40% infertile. While *A. mellifera* in U.S. is the least tolerant with the lowest infertility rate (10-20%) in worker brood. In a strain of European bee that was artificially selected to be tolerant of mites, infertility of mites plays the most significant role in depressing the mite population, while other factors (such as grooming behavior, hygienic behavior, and the duration of the postcapping period) are not as important (Harbo and Hoopingarner, 1997). Although we currently know that the original "SMR" (suppressing mite reproduction) trait is actually due to "VSH" (*Varroa* sensitive hygiene), VSH can be considered a special trait causing lower reproduction, due to the interruption of the reproductive cycle of the mites, especially since the bees do not open cells containing non-reproducing mites, but rather target those having mite daughters.

Factors Affecting Mite Reproduction

Brood Caste

It is known that *Varroa* mites preferr drone brood over worker brood, in a ratio of nine to one. That is, if there is an equal number of cells available, the drone brood would harbor nine times as many mites as the worker brood. Natural selection undoubtedly favored mites that preferred drones, because drone brood has a longer capped-period, enabling more daughter mites to mature. Indeed, Martin (1994, 1995) calculated the effective reproduction rate (i.e. the number of vial/mature daughters per invading mother) as 1.3–1.45 in a single infested worker brood, while for drone brood it was 2.2–2.6. In *A. mellifera*, transferring mites from drone to worker brood always deceased mites' reproduction rate, while transferring mites from worker to drone brood increased reproduction rate. Queen larvae would be a dead end for invading mites, because queens emerge at 16 days, five days faster than a worker, thus leaving the daughter mites no time to mature. *Varroa* mites do avoid queen cells, apparently due to some chemical odor from royal jelly.

Host Species

The transferring of mites across different species suggests that host species also affects mite reproduction. When mites from *A. cerana* were introduced to *A. mellifera* worker brood, only 10% of the mites reproduced, while 80% reproduced when *A. mellifera* mites were transferred to *A. cerana* worker brood. In our study, *Varroa destructor,* Korea haplotype, from *A. mellifera* reproduced equally well (all > 90% reproduced), regardless of whether it was transferred to *A. mellifera* or to *A. cerana*, in both drone and worker castes (Ting Zhou, Shuangxiu Huang and Zachary Huang, unpublished data). In contrast, *V. destructor,* Vietnam haplotype, from *A. cerana* only reproduced on *A. cerana* drones (83% reproduced, N=62), and not on *A. cerana* workers (0% reproduced on workers, N=60). These results suggest that the mites on the two honey bee species are different: mites from *A. cerana* refrain from reproducing on worker brood of the same species, and mites from *A. mellifera* reproduce well on worker brood, regardless of the host species. It appears that only the Korea haplotype of *V. destructor* had a genetic change that enabled it to reproduce on either drone or worker brood in *A. mellifera*, therefore allowing it to build up to levels damaging to the bees. In China, my colleagues and I did not find damaging levels of *V. destructor* in *A. cerana* colonies – in fact, in most locations, the mites could not be found. When we found it, it was the Vietnam haplotype which does not reproduce in the worker brood of *A. cerana.* It is not clear why the Korea haplotype of *V. destructor* does not cause damage in *A. cerana,* since they can reproduce in both worker and drone brood in transfer experiments. However, it is possible that they do not reproduce on worker brood under natural conditions, when both the phoretic and reproductive hosts were *A. cerana.* Thus, transfer experiments should be supplemented with observation under natural conditions for the full picture.

Effect of Cell Size

Partly because mites reproduce better in drone brood than worker brood, people tend to think that smaller cells would decrease mite reproduction. However two recent studies show that there was either no difference in mite population between colonies (Ellis et al., 2009) using

"small cells" (4.8 to 4.9 mm diameter) and regular foundations (5.2-5.4 mm), or small cells actually had a significantly higher mite population (Berry et al., 2010). Unfortunately, neither of these recent studies determined the fecundity or fertility of mites in the two types of cells.

Earlier studies were conflicting. Taylor et al. (2007) found that "foundation" cell size did not affect the reproductive success of *V. destructor*, but more mites invaded cells drawn from the 4.8mm foundation. However, Piccirillo and De Jong (2003) and Maggi et al. (2010) found that mite invasion rate increased positively, and linearly, with the width of worker and drone brood cells, probably because brood that develops in large cells receive more visits from nurses, increasing the invasion chance. Maggi et al. (2010) also found that the percentage of fertile mites was lower in smaller cells. An earlier study (Message and Goncalves, 1995) showed in Africanized bees, larger cells had a higher invasion rate, and also had higher effective fecundity in mites.

Our own study suggests that cells that are too large also reduce mite reproduction (Zhou et al., 2001). In a study trying to determine the mechanisms of why *Varroa* mites do not reproduce on worker brood of *A. cerana*, we accidentally discovered that in both *A. cerana* and *A. mellifera* queens laid worker eggs in drone cells in the Fall. We took advantage of this, and compared the reproductive output of mites on two hosts: workers reared in worker-cells (WW) or workers reared in drone-cells (WD). In 2001, both the fertility and fecundity of the two groups were significantly different (Fig. 4). It is not clear why mites would reproduce less on identical hosts that were housed in larger cells. One possibility is that workers reared in drone cells are fed a different diet by nurses (One study showed workers reared in drone cells were heavier and had more ovaries, suggesting a different diet or more nutrition). A second possibility is that workers spin larger cocoons in drone cells, and mites detect the extra space, and this affects their reproduction.

Effect of Humidity

Kraus and Velthuis (1997) wondered why *Varroa* mites were not as big a problem in the tropics (besides that fact that most bees were African), and tested in the laboratory to see if high relative humidity would inhibit mite reproduction. They artificially transferred single mites into newly capped cells, and then kept the brood in an incubator. When relative humidity (RH) was set at 59–68%, on average, 53% of the mites produced offspring (N=174 mites); under 79–85% RH, only 2% (N = 127) of the mites reproduced. The difference in mite fertility was highly significant. My postdoctor recently incorrectly set the incubator at a RH of 75% (instead of 50%), and very few mites reproduced as a result. If there are ways to artificially increase the hive RH to about 80%, then the *Varroa* mite population will never increase to a damaging level.

Effect of Comb Movement

Aside from where they defecate, *Varroa* mites are also very picky about where they feed. The mother

herds her "children" to one particular feeding site on the pupa (between the pair of hind legs on the ventral side of the abdomen), and then leads them back to the defecation site. Therefore, any rotation of combs will cause the movement of the host pupa? and perhaps causes disorientation of the mites. The "Kônya beehive with rotating frame [sic] of brood nest" was invented (and patented) by Lajos Kônya, from Hungary. The hive body has round frames and they rotate 10 degrees per hour, thus completing a circle in 36 hours. This is powered by a 12 volt battery. *Varroa* mites are not able to reproduce, due to the constant rotation of the cells. I was pretty confident that the claims were true based on mite reproductive biology. However, an abstract (Aumeier et al., 2006) said they studied the rotation of combs on mite reproduction for three years and found no evidence that it worked. Daily rotating or shaking of brood cells neither "affected fertility (93-100%) nor fecundity (2.6-3.0) of reproductive mites or mortality of mite offspring in the brood cells." This is a bit surprising because I thought prior to filing for the patent, the inventor should have obtained data showing that the rotation affected mite reproduction? However the study did report that swarm cells were removed due to the rotation, so the Kônya hive does work for swarm prevention.

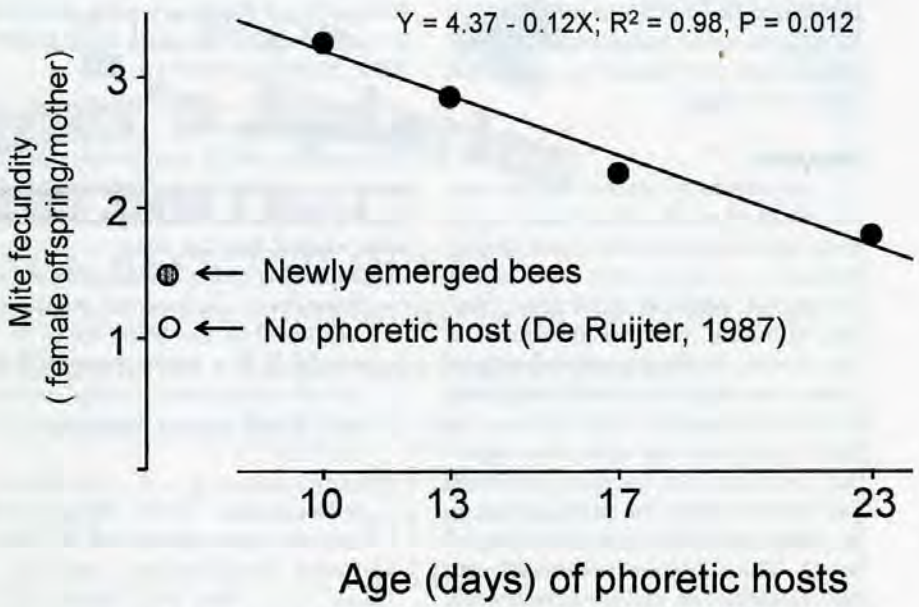

Figure 4. *Negative relationship between mite fecundity and age of phoretic hosts. This relationship is only true if one uses bees of nurse ages and older, because newly emerged bees as phoretic hosts also cause low fecundity (shown by the gray circle), which was slightly higher than those without going through a phoretic host (empty circle, data calculated from De Ruijter, 1987).*

Host Age, a Kairomone, a Hormone, a Pheromone, and Genes

Varroa mites that have been artificially introduced into brood cells that have been capped for over 14 hours will never reproduce. Of mites that were introduced to cells 12 hours post-capping, about 10% reproduced. Garrido and Rosenkranz (2004) therefore hypothesized that an odor from fifth instar larvae are used as signals by mites to activate their ovaries. This chemical, since it benefits the receiver, should be called a kairomone. They then designed a special cage to confine mites over various testing objects, and found that mites activated oogenesis after perceiving larval volatilities, and those mites were deprived of food, since any bee blood could also contain signals. Pentane extracts of the larval cuticle also caused ovary activation, suggesting that the chemical signal is polar. The chemical remains unidentified.

Initially there was a hypothesis that the juvenile hormone (JH) in the honey bee larvae/pupae could be the factor that activated *Varroa* ovaries, and therefore regulated their reproduction. JH is an important hormone and in most insects it regulates oogenesis and spermatogenesis. This theory was abandoned after observing no differences in JH titers in Africanized and European bee larvae, even though it has been proven that Africanized bees have much lower mite reproduction rates (mainly due to a much higher percentage of infertile mites).

When more than one mite invades a single brood cell, the per capita fecundity decreases, as the number of mother mites per cell increases. Mites invading brood cells in older combs also have fewer offspring. This led scientists to speculate that mites themselves might have a chemical to inhibit each other's reproduction (a pheromone). A chemical, (*Z*)-8-heptadecene, was identified. In the laboratory, it caused a 30% reduction in mite fecundity. When tested in the colony, the average number of offspring was 3.48 in cells treated with (*Z*)-8-heptadecene, but 3.96 in control cells. This difference was small, but statistically, highly significant ($P < 0.01$). The effective fecundity (number of potentially mated daughters) was 0.94 in treated cells, and 1.31 in control cells; and this level of difference should have a rather large impact on population growth.

To initiate reproduction, many complicated physiological processes have to be in place. Finding genes critical to these processes can potentially lead to new ways of mite control. My lab recently started a project to hunt for genes important for survival and reproduction in mites, through the use of RNA interference (RNAi). RNAi is a method to inject a relatively large stretch of double stranded RNA (400-500 base pair long), which gets cut into 20-30 bases long, then binds to some complexes which eventually finds complementary stretches of RNA and degrades them, resulting in the reduction of a targeted gene's messenger RNA and ultimately their protein product. Our basic principle is to search for the same genes regulating survival or reproduction in related organisms (e.g. ticks) in the mite genome, synthesize double stranded (ds) RNA, inject the dsRNA into mites, and then observe their survival. If the injected mites survive, then we proceed to observe their reproduction by introducing them into newly capped brood cells. Once a list of genes are found, we then need to ensure that the dsRNA are specific to mites, and

will not affect bees, then find a way to introduce the dsRNA to mites (either directly or to the hemolymph of bees, which then get passed to mites due to their feeding).

Summary

In summary, many factors can affect mite reproduction. These range from type of reproductive host (drone, worker, or queen), cell size, age of the larvae, phoretic host type, relative humidity, or even movement of the combs. The more we understand about how reproduction is regulated in mites, the easier it will be for us to find a way that disrupts mite reproduction while not harming the bees. The trick is that the method has to be easy and economical to implement. Thus, "basic research" into the reproductive biology of mites will eventually become useful to beekeepers, as it may one day provide a new method for mite control.

Acknowledgement

I thank Melissa Huang, Meghan Milbrath, and Xianbing Xie for reviewing this manuscript. Research in the author's laboratory on *Varroa* reproduction was supported by a USDA SCP grant, the Chinese Natural Science Foundation, MSU GREEEN, and more recently (RNAi project) by grants from the Foundation for the Preservation of Honey Bees, National Honey Board, Almond Board of California, and MSU GREEEN. Research on *Nosema* was supported by a Managed Pollinator CAP USDA NIFA 20098511805718. BC

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Meet Vaughn Bryant, Honey Sleuth

M.E.A. **McNeil**

What's that honey? Odds are, it's not what it's labeled. And scofflaws are erasing the pollen fingerprints.

"I am just starting to feel comfortable," said Vaughn Bryant, 40 years into his career as a palynologist, a pollen scientist. What he means is that he has acquired the skill to identify hundreds of common pollens through a microscope and key out thousands more – something that can be done only by a long-trained human eye. He is a specialist in melissopalynology, the study of pollen found in honey, which he does "because it is a challenge, and it has broadened my knowledge of pollen."

As he spoke at his lab at Texas A&M University, he was processing samples of honey from all over – from a Florida packager concerned that her tupelo honey was valid, from members of the North Carolina State Beekeepers Association checking to see if store-bought sourwood honey was authentic, from importers, sellers and curious beekeepers spanning the country wanting to know if they have premium honeys favored for taste, mead making, cuisine, or lack of crystallization – white acacia, ironwood, fireweed.

"I'm flooded with samples," he said. "I tested an East Texas tallow honey that was not tallow at all; it was a blend from the Dakotas. A sample of California clover honey turned out to be from canola and rapeseed. I have had buckwheat honey with no buckwheat in the sample, star thistle with no star thistle. People have no idea what they are buying, both importers and local buyers. Right now it is a crap shoot. You may or may not get what it says on the label, and that's wrong." A Virginia merchant labels his tested honey with Bryant's name, the only person in the United States doing this analysis routinely.

Although isotopes of sugars can be indicators, pollen identification is hands down the best way to determine the source of a honey. It can trace what bees forage to identify prized varietals. It can also place a sample geographically – crucial to the American honey market, which was flooded with underpriced Chinese honey that undercut the stability of domestic beekeepers. Those imports are often diluted and cannot be guaranteed to be of the stated floral source. "There is purposeful deception, but many unknowingly have it wrong, saying 'This has got to be mesquite because I saw bees all over the mesquite flowers.'" How often? "60% of the samples I test are not what they are said to be," said Bryant, who has verified that estimate with several thousand samples.

Bryant holds degrees in geography, anthropology and botany. Son of an Associated Press correspondent, he'd lived in 14 countries and become trilingual by the time he was seven, so geography was a natural start. His fascination with fauna and cultures of the lands followed, with their stories to be unlocked with clues found in pollen. It is this combination of disciplines that allows him to link pollen to plants and plants to their geographical range, revealing the provenance of a honey.

He has been a professor at Texas A& M since 1971, where his first commitments are to teaching students and directing the palynology research laboratory there. Much of his lab work involves forensic pollen studies in criminal investigations, but he also uses pollen to detect paleoenvironments, ancient human diets or the cargos from sunken shipwrecks. About a quarter of his time is devoted to pollen and honey research. "My University salary comes from being a professor, doing archaeological work and teaching, not from testing honey samples," he said. "The honey testing is important because it funds graduate students and buys the supplies needed for the pollen research lab."

Bryant's work with honey began in 1975, when the Office of Inspector General of the USDA approached him to test the origins of domestic honey purchased by the federal government as part of its farm loan program. "I had no idea what I was getting into," Bryant said. "I thought it would be easy. At $70 per sample, I probably earned about 10 cents an hour, but I sure learned a lot about pollen and honey." He did discover that about 6% of the samples were foreign honey, mostly from Mexico, that was fraudulently sold to the government.

Since then, he has amassed a multi-million dollar collection of over 20,000 pollen samples from around the world, housed in cabinets with slide-out trays in his lab. Much of the collection, he says, was donated by oil

companies, BP-Amoco and Exxon-Mobil, which use pollen to define the ages of rock strata during oil exploration.

The U.S. imports almost half of the honey it consumes. In 2001, the government imposed high tariffs on Chinese honey, which was priced lower than its cost and undercut the domestic market by about half of what American beekeepers could ask. Since then, honey exports from other Asian countries have risen dramatically, again at low prices. Bryant has found samples from Viet Nam, Cambodia, Indonesia and Laos that contain "a little honey from those countries and a majority of the blend coming from Chinese sources . . . At the rate the Chinese are dumping this honey, it could devastate the U.S. honey industry," he said.

The goal of the melissopalynologist, connecting pollen with nectar source, is not a simple proposition. For starters, worldwide there are about 330,000 flowering plant species, each with its unique pollen. And the ability to distinguish one microscopic speck of that pollen just gets you in the door to a labyrinthine puzzle.

If you are current on bee biology and behavior, skip on, otherwise it is useful to briefly review the relationship of honey bees to pollen. It is the bee's major source of proteins, fatty substances, minerals, and vitamins – vital to the growth of larvae and young adult bees. Pollen is the key to reproductive survival for the bees as well as the flowering plants. In the 40s it was discovered that colonies could survive but not reproduce on sugar syrup alone; when pollen was added to the syrup, egg laying began within 12 hours.

While pollen looks like food to a bee, for a flower it is the source of its male gametes or sperm cells. Grains hitch a ride on a pollinator – animal, water or wind – to a compatible pistil, where pollination occurs. That is to say, a pollen tube is produced that transfers the sperm to the ovule, the female gametophyte. While a forager is gathering nectar or removing pollen from an anther, grains adhere to the feathered hairs that cover her. She combs the pollen from her body, adds a little nectarto hold it together, and transfers it to pollen baskets, the corbiculae, on her posterior legs.

How does pollen get into honey? On the flower, a honey bee can dislodge grains that fall into the nectar that she then stores in her honey sac. In the hive, pollen that she carries on her body can be groomed off or tracked by other bees to open cells of unripe honey. Airborne pollens produced by anemophilous, wind-pollenated plants, can be blown into a hive, and bees collect pollen from wind-pollinated plants as well; although those pollens are a small fraction of the pollen spectra found in honey, they can also serve as geographic markers.

One complication for the melissopalynologist, and it is not a small one, is that the types and percentages of recovered pollen in honey are not a 1:1 correlation with their related nectar. Far from it; many pollen types are over or under-represented in the relative counts in honey samples. For example, some plants, such as sourwood and fireweed, are weak pollen producers or, for morphological reasons next explained, are not found proportionately in honey. So to know the true nectar content of a honey is to unravel an intricacy of pollen mass, pollen morphology, pollen production, and method of dispersal – enough to leave you holding your head before it is mentioned that it also involves flight time of the bee.

Forensic Palynology Imaging.

In the 1940s two USDA scientists, Frank Todd and George Vansell, collected the nectar from more than 2,600 flowers representing 73 different plant taxa in California – from the honey stomachs of bees that had just fed on a specific plant as well as from flower nectaries. They established pollen concentrations for each nectar source, demonstrating that pollen content varies widely by floral species. Their research became the foundation for the later development of pollen coefficient (PC) values, correctives for these variations. Researchers have continued to refine PC values to come up with more reliable determinations of nectar sources.[1]

"Not all flowers are made the same," said Bryant. And honey is rarely from a single botanical source; the term "unifloral" describes honey that is produced mainly from one plant species. Some 50 years ago, The International Bee Commission set a standard for a varietal honey – 45% of the total pollen needs to be from that plant. "There is no way in hell you could get 45% fireweed pollen in honey." With a simple relative pollen count, one tested Alaskan honey sample would have been classified as rapeseed-canola honey, since it had only 6.3% fireweed pollen; but when the PC value is considered, the primary nectar source becomes fireweed flowers at 95%, not rapeseed/canola flowers at 1.9%. The range is enormous: In fireweed honey there are 2-3000 grains of pollen in 10 grams of honey – 0.1% of that found at the other end of the spectrum in pollen-dense forget-me-not honey, which averages 1.5 million grains per 10 grams of honey.

He cited other examples of pollens with a low ratio of pollen to nectar. New Zealand thyme honey is considered a premium commercial type, although thyme pollen rarely reaches a total of 45%. Flowers from some species, such as blueberry and heather, produce small amounts of pollen. Some species have flowers that are morphologically more difficult for pollen collection, such as alfalfa. Other pollen types that are usually underrepresented in honey samples include basswood, avocado, orange blossom, thistles, mint and locust. In contrast, some pollens proliferate in the nectar – "You expect a pure clover, eucalyptus, or canola honey to have much more than the required 45%," Bryant said.

Scientists have long known that bees remove pollen

Vaughn in his lab.

from nectar in their honey stomachs. Scientists studying dysentery in honey bees in the 1920s found pollen grains in bee feces and determined that grains were ingested along with nectar. What we know now is that once in the honey stomach, nectar flows over the proventriculus, the organ that acts not only as control for the nourishment entering the bee's digestive tract but as a nectar filter. Nectar in the honey stomach is drawn back and forth through triangular lips of the proventriculus, removing much of the pollen, fungal spores and debris which might spoil the honey to be made from it. A valve prevents the filtered nectar from passing into the bee's digestive system but permits the particulates to pass.

Bees are more efficient at filtering out large pollen grains produced by some plants, such as honeysuckle and fireweed. Conversely, small pollen grains, such as those of eucalyptus, sweet clover, and chestnut, are usually over-represented in honey; their numbers are prolific, and fewer grains are filtered out by the bees. The filtering process is rapid and effective, taking only about 10 minutes to remove most of the pollen from the nectar. The phenomenon caused by foragers filtering nectar-laden pollen and defecating it as they fly is called yellow rain. Perhaps the recipients of those showers on their cars and patios would be less peevish if they thought of them as purifying honey.

So, foraging time is added to the influences on the amount of pollen in the resulting honey – depending on the length of flight, the bees can remove as much at 90%. Also, it is known that some bees are more efficient at removing pollen from their honey stomachs than their sisters.

With so many variables, the potential for error in determining the nectar source of a honey can be great, so lab work needs to be precise. Over the years Bryant has refined his analytical protocol, realizing that the century-old methods of diluting honey samples with water lost a small but significant number of grains. "Lipids on the outside of pollen are buoyant, and pollen grains can contain air in vacuoles. 95% sink, but some float. You could lose a small portion, and you need to look at all the pollen," he said. There was also loss of pollen during centrifugation. A former student developed a filtration process that addressed the problem, which is used, but it is expensive and time-consuming. Bryant and Gretchen Jones, then his grad student and now a palynologist with the USDA, came up with a simpler solution (so to speak): "We solved it by dropping the specific gravity with ethanol." Both the filtration and alcohol processing methods increased pollen recovery from honey samples by an average of more than 200% over water dilution processing methods normally in use.

Jones and Bryant also established a ratio of added tracer spores for each test – using a fern-like plant, *Lycopodium*, which would not be found in honey – to create a reliable matrix for the pollen count.

There are several ways to examine honeys. "With light microscopy I can go down as far as necessary for most identification," said Bryant. "For example, I can often say a pollen grain is from some genus with the light microscope. But I can't refine it down to the species. If you need to know which species, it is necessary to move to the scanning electron microscope, and for that you need deep pockets. In one sample, I identified pollen as being

basswood, and with the electron microscope we found that there were really four different species of basswood in the sample."

"As for identifying honey by the isotopic signatures, there is a paper on the isotopes in the Canary Islands. So if you have a sample from the Canary Islands it's good, but not much has been done for the rest of the world. The problem is that isotope analysis of honey can be done, but there is no worldwide databank to compare it to."

"I have been creating a pollen data base for domestic honey," said Bryant. Still going strong at 71, he hopes new melissopalynolgists will enter the discipline to refine it. "I don't know of anyone willing to expand the pollen coefficient database. The research would be very time-consuming although it is not difficult. Most of the work was done in the 40s 50s and 60s by women because I think they have the needed patience." The work would involve a new series of experiments to determine the precise PC values for many of the nectar sources used to produce premium types of honey. One benefit of such research could be that honey samples from specific species could provide the opportunity to determine pollen amounts and the expected ranges of pollen for those types.

As to the potential for automating pollen identification analysis, Bryant said, "Currently some computer program can recognize and count limited numbers of pollen types, but they still have trouble differentiating some types and especially identifying broken pollen grains. There's meetings coming soon to address the potentials for refining a useable automated pollen counting system. Right now, for honey and for forensics pollen work, the human eye is better than the computer. Nevertheless, such a technique might soon become reality, and when it does, there would still be the need for palynologists to check for errors. If it works, it would have so many applications it would be like inventing fusion energy."

One problem that he hopes the federal government will address is accurate honey labeling. Bryant analyzed 60 honeys brought to him by Food Safety News, a web-based newspaper dedicated to issues of food safety.[2] The samples came from farmers' markets, and big box, grocery, natural food and drug stores across the country. More than 75% of the samples had all the pollen filtered out.

Does it matter? Any discussion of nutritive value aside, there is no way to identify not only the floral but the geographic source of the honey with its pollen fingerprints removed. The food safety divisions of the World Health Organization and the European Commission have ruled that without pollen there is no way to determine whether the honey came from legitimate and safe sources. "You can't sell honey to EU countries without pollen proof," said Bryant. Florida has passed new laws saying that honey for sale must contain pollen, and North Carolina has new regulations to verify sourwood honey sold in that state.

The problem is Congressional law, according to Bryant: "The USDA standards for honey sold in the U.S. state that it is okay to sell honey without pollen. The problem is the foreign or illegally imported honey with no pollen. We have no way to track the honey, no idea where it comes from. We have strict laws and tariffs to protect U.S. citizens against illegally-imported honey,

but with no pollen there is no fingerprint of origin. The American Beekeeping Federation has lobbied Congress to pass laws.[3] Beekeepers have been pleading with the federal government to enact stricter guidelines." Five U.S. honey producers have begun a campaign, now called True Source Honey, to raise consumer awareness of the problem with imports.[4]

"We've never had 'truth in labeling' for selling honey, and we should," Bryant said. "The U.S. needs to make it illegal to import filtered honey because it is almost impossible to detect where it came from. Most other countries do have laws, so why don't we?"

Recent arrests of a Taiwanese executive and a Chinese honey producer for separate fraudulent honey labeling schemes have stopped a few of the millions of pounds of illegal honey entering the country. But Bryant says there are other examples: He has examined imported honey for US companies that were blended or filtered and don't match what the companies thought they bought.

He does get to have some fun with it. Asked to analyze the honey from the White House hive, he concluded that it is a unifloral clover honey with minor amounts of other nearby nectar, including dogwood, honeysuckle and magnolia – a bona fide taste of the Washington neighborhood served at State dinners.

Bryant continues to run his one-person CSI operation. He said, "I'm trying to help out here and there, but it's almost impossible to keep up." The kind of pollen analysis of honey that he does for a fraction of the cost can run as much as a thousand dollars per sample at some European labs. We hope that others will take up his quest and learn to understand what he comprehends through the ocular piece of his microscope.

He has a mission: "People want truth in honey labeling. That is one reason I do this work." BC

M.E.A. McNeil is a journalist and Master Beekeeper who lives on a small organic farm in San Anselmo, California with her husband and son. Contact her at: mea@onthefarm.com.

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[1]Tables relating nectar sources with pollen counts can be found in: "The R-Values of Honey: Pollen Coefficients", Vaughn Bryant and Gretchen Jones, **https://www.jorgensensapiary.com/download.../1-r-value.html**

[2]**http://www.foodsafetynews.com/**, "Top Pollen Scientist Finds Honey a Sticky Business"_

[3]See: "Statement of the American Beekeeping Federation, American Honey Producers Association, National Honey Packers and Dealers Association, Hearing on 'Customs Trade Facilitation and Enforcement and a Secure Environment' before the House of Representatives Committee on Ways and Means Subcommittee on Trade, May 20th, 2010. **http://democrats.waysandmeans.house.gov/media/pdf/111/2010MAY20_ABF_AHPA_NHPDA_Submission.pdf**

[4]**www.TrueSourceHoney.com**




In Beekeeping And In Life, Few Things Stay The Same

James E. **Tew**

Whether or not we like it, everything changes.

Beekeeping then and beekeeping now

For many years now, I have absolutely loved keeping bees, but over time, my love has had to evolve. Since I began keeping bees approximately 40 years ago, many things have changed and many people have come and gone. For the most part, the bees are still the same. I need to talk about some of those changes.

Beekeepers – then and now

While the same in many ways, modern beekeepers represent a change in several significant areas. In years past, bee hive management had a strong agricultural flavor but, for the most part, it does not have such a strong connection today. Beekeeping was frequently a part-time job for many and for others it was the sole income provider for the beekeeper's family. Then and now – most beekeepers are in it for pleasure and enjoyment. Many of our challenges then (1970's – 2000) are easily recognizable now. Concern over pesticides, wholesome honey production techniques, honey prices, disease control, Winter losses, swarm control, queen genetics . . . All the same as today. But, many other primary aspects of beekeepers and beekeeping are morphing into a newly-styled beekeeping community.

Commercial Beekeeping

Thirty to 40 years ago, there was a logical sequence to beekeeper growth. An energetic new beekeeper would begin as an enthusiast (a hobby keeper); grow to several hundred hives or enough to provide supplemental income (side-line beekeeper) and from that group a very select few would progress to full-time beekeeping. Today, few of you are aspiring to become anything other than an enthusiast. To a degree, I sense that part of this change has been caused by the evolution and adaptation of the pathway to true commercial beekeeping.

Years ago, a family business would commonly run something like 1200 – 1400 colonies – maybe more. A home operation with commercial honey production at the center and protected local marketing accounts rounded the operation out. Pollination rental fees were barely worth the colony move. If one did it at all, commercial pollination was something to do with the colonies at times when there was no nectar flow ongoing. Individuals' livelihood depended on beekeeping. Often, these people were in close contact with elected officials and dogged university researchers for pertinent information. They won some battles and they lost some battles, but what is important is that they fought for beekeeping. But it was not just commercial beekeepers who fought. Some of the most tenacious, confrontational beekeepers I have ever known never had more than a few scruffy colonies. People of this ilk are seemingly all gone. I miss the disruption and din that they caused.

Presently, commercial beekeeping seems to be near the ceiling of our ability to manage large numbers of bees. Computers and GPS certainly help, but when all aspects are considered, it comes down to frames, hive bodies, drawn combs, disease control, queen productivity, and the like. Fundamentally, at the most elementary level, commercial beekeeping is today as it was about four decades ago. I have lamented that our industry was not keeping pace with our agricultural cousins such as row crops, animal production, dairying – indeed even common farm equipment has evolved to unimagined levels. The tractor, with which we farmed 50 years ago, is barely considered to be a garden tractor today.

But while commercial beekeeping may not have changed enough, it has certainly changed in some very significant ways. Aggressive commercial beekeepers must now be long distance haulers – even to the extent of completely trucking across the country. Interstate regulations, individual state quarantines, dealing with fueling stations and escaping bees, semi-rig driving certifications, acquiring experience in operating such a large load of live bees, scheduling and booking pollinations sites, loading/unloading . . . this is not commercial beekeeping of years past. This is migratory beekeeping today and it's expen-

What do these two beekeepers have in common?

sive to do. It requires technical skills on many fronts and as we have all realized in the past few years, it is risky. Bees seemingly die more easily now than they did in years past. Finally – I get to one of my points . . . who amongst you new beekeepers who are reading this are planning to become commercial operators? Not many?

So what does that mean? When a commercial beekeeper decides to sell or to take on new (younger) partners, the selection pool is scant. In one of the southern states, a long-time established beekeeper recently sold his bee farm and land for millions of dollars. The actual value of the bees and bee equipment was minimal compared to the value of the land. His geographical area is increasingly crowded meaning that a commercial beekeeping enterprise of his size will never be practiced there again. In many states, commercial beekeeping is highly specialized for the highly specialized few.

Beekeeping Enthusiasts (Hobby Beekeepers)

During the dark years of Africanized honey bees and mite invasions, beekeeper numbers dwindled to all-time lows. Those of us who survived those times were hard-headed and committed to bees for our duration. How could we entice new people into becoming apiarists? We anguished. We subdivided our industry into *"haves"* (AHB or mites) and *"have nots"* (no AHB or mites – yet). We fought amongst ourselves. As years passed, society changed and slowly became more tolerant of keepers and their bees.

The perfect bee storm

In 2006-2007, the U.S. bee industry was hit by the most perfect storm of our bee lives. Colony Collapse Disorder (CCD) galvanized the public's imagination. Were we hanging on the edge of a world having no bees? Everyone was concerned. On the second front, urban/suburban agriculture or the "greening" of large metropolitan areas became vogue. Locally, highly nutritious vegetables produced in urban gardens in the middle of inner city food deserts was the right thing to do. Beekeeping has become the fashionable thing to do. It would appear that everyone either wants to keep bees or to research them. At meetings everywhere, new beekeepers have signed on in significant numbers. Happy days are here again!

A new group of beekeeping trainees with new needs and expectations.

True – Happy Days are here again

Absolutely, the present time is the grandest time – ever – to be a beekeeper. Equipment manufacturers and suppliers are in financial heaven. For the past few seasons, packages and queens have sold out. New clubs have sprung up and established clubs have added new members. Everything is injected with a high speed information delivery system that was far, far beyond the scope of science fiction just a few years ago. We blog and tweet. We surf the web. We set up social media networks. In milliseconds, we can procure information that would have taken months to acquire several decades ago.

The new and improved beekeeping industry

If any of the old beekeeper survivors thought that just bringing in new beekeepers and new technology would somehow bring about the rebirth of the old-styled, troubled bee industry, they were wrong. Beekeeping as we knew it decades ago is presently morphing itself into *the new and improved beekeeping industry* - modern and technologically suited for the beekeeper of today and the beekeeper of today is not the beekeeper of yesterday. That is a very healthy thing for the overall survival of our passion.

But . . . there are changes

True, many groups presently have full rooms of new beekeepers, but they are not necessarily there for all the old, traditional reasons. Very few – if any – of these people have an interest in pursuing beekeeping as anything other than an ecologically rewarding diversion. Beekeeping is something they *do*, but it is not who they *are*. That was true before of earlier beekeepers, but not so stringently. As before, it's still difficult to get members to serve as club officers. That's just human nature. As before, it's nearly impossible to get most groups to develop state and national political strategies for supporting state and

federal agency bee programs. In many instances, those programs, when left undefended by a commodity group will be reduced or even eliminated.

Our modern-day triadic beekeeping industry

Different states in different regions have always had different flavors to their individual beekeeping industries. Today, some states are home to large commercial industries while other states support large numbers of hobby beekeepers but have few commercial operators. Over time, I sense that increasingly our industry has subdivided itself into three groups: Academic beekeeping, hobby beekeeping, and commercial beekeeping. Each of these groups has their own agendas and goals and is semi-autonomous. A commercial beekeeper recently told me he rarely attends bee meetings, *"because he didn't get much from sitting around a bunch of hobby beekeepers."* To survive and thrive, academic programs must go where the funding is but that is not necessarily where the commercial and hobby needs are. Hobby beekeepers are passionate and hungry to learn, but beekeeping is more of a social event rather than an industry structure. Even if these subdivisions truly exist and are as defined as I describe them, are they a bad thing? No, but they do exemplify the changes that our unique industry is undergoing. Beekeeping is changing itself – adapting – modifying – surviving. As a group, we keep holding on. That's a good thing.

James R. Tew

A memorial to my Dad, James R. Tew, an Alabama Beekeeper (1921 – 2012)

My Dad was 91 at the time of his death this past August. He was a World War II veteran, a business man, a religious man and a passionate gardener. Of course, he was an avid beekeeper. Dad was just generally an upstanding fellow.

I knew he was increasingly weakening. The common response was, *"Well, he is 91."* I didn't care if he was 191, I didn't want to lose him. Having visited my Dad for nearly a week, my wife and I left for Decatur, Alabama, for the annual North Alabama Beekeepers' Symposium – 2012. After the meeting, we made the five-hour drive straight home and arrived in time to talk with Dad and Mom for an hour before bedtime. Between oxygen-subsidized breaths, Dad asked all kinds of questions about the meeting. I dutifully answered though I wondered why he needed so much information. He suddenly blurted, *"Does anyone in the Alabama Beekeepers Association remember me?"* Though he has been unable to attend meetings for about seven years, I assured him that he was certainly not forgotten. I even coughed up a few names of old beekeepers who I thought would remember him. Dad was placated and satisfied. That was the very last rational conversation I had with my Dad. Within 30 minutes, he peacefully died as he prepared for bed.

My Dad was like so many other old beekeepers – still interested – but no longer of sound body. He only left home for medical appointments. While we go about our bee business of requeening, supering, controlling *Varroa* and harvesting honey, I hope we can find time to remember all those who have gone before. Each time we lose one of these old beekeepers, a part of our beekeeping world changes. Our craft is not destroyed because these people pass, but it does change. In beekeeping and in life, few things stay the same. BC

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Fifth In A Series – Beekeeping Instructor's Guide & Essentials

Larry **Connor**

We had four sessions on teaching beekeeping that ended in April. This session deals with the Bee Nest or Hive and how to visit the hive as a teacher with students. Here are the topics we will cover:

The Bee Nest or Hive.

- Parts of a natural hive.
- Parts of a beekeeper's hive.
- Bee stings and protection.
- The Smoker, how it works and how to use it.

Class activity –

- Look at a natural hive from a bee tree.
- Comparison with a wasp nest (without wasps).
- Assemble beehive.
- Economics of wood+wax vs plastic frames.

Typical Course Structure

As a reminder of how we will approach these sessions, I am repeating the Typical Course Structure which appeared in the first of the series:

Most classroom teachers are required to prepare lesson plans for each teaching experience. A lesson plan includes many things for modern teachers, and I have chosen to leave aside the educational aspects of a lesson plan (like measuring a student's knowledge or attitude toward a particular subject before and after the lesson, or measuring the success of the unit taught, and other components of education theory). For our use, I focus on four components I want to include in my class structure, much of it offered somewhat informally:

1. What is to be taught (stated in a lesson plan or planning notes)
2. Pre-teaching the subject using traditional classroom sessions as well as high tech research options
3. A field or hands on session in the orchard, apiary or honey house
4. A follow up laboratory session to examine what has been collected.

Arizona wild hive.

The Beehive Pre-teaching

Parts of a natural hive.

Non beekeepers have preconceived ideas of what habitats bees live in. Thanks to Walt Disney animation, bees are often shown to live in hornet-like nests hanging in trees. This is a case of species confusion, as to what is a bee, a wasp, or a hornet. Bees are vegetarians, while wasps, yellowjackets and hornets are carnivores.

Collect as many photos and drawings as you can of honey bees, *Apis mellifera* L. in natural settings. Of course, for folks in ecosystems filled with large trees, it is easy to find bee nests in large trees in forests and parks. But bees also live in the sides of buildings, unfilled walls of out buildings, water meters, and other human made items. There are other sites bees used in other climates. In the deserts the bees live in rock outcroppings formed from erosion and animal burrowing. They are located near a natural source of water. In warm climates they may be found in less protected areas, such as under a limb of a large tree, and live very successfully there.

Use a drawing or photo of a cross section of a natural nest. Review with the students the following aspects of the nest: The construction from the top down, the use of propolis at the entrance and to coat the inside of the nest, the size of the opening of the nest, the location of honey, brood, drone production and queen cells (especially for swarming).

Parts of a beekeeper's hive.

Using drawings and photos, show the students the makeup of a standard Langstroth hive (unless you are in an area exclusively of top bar and/or Warre hives). If you live in a country other than the U.S. use the standard hive designs of your area. Show the construction of the comb, the attachment to the frames, their use of foundation or starter strips, the use of propolis to reduce the size of entrances and to keep the frames from moving in the wind, the size and position of the opening of the nest, and the location of the honey, brood, drone production and queen cells (especially for swarming).

Introduce L.L. Langstroth, the person associated with the development of modern beekeeping by developing a movable frame that recognized the need to respect the bee space, the room needed by two bees to work on parallel combs with room enough to pass, yet providing the most efficient use of the cavity of the nest.

Look at beekeeping using Langstroth equipment. Three standard frames, the standard, the medium (also called the Illinois or Western frame in different parts of the country). and the shallow frame. Review the various hive configurations beekeepers use in their hives. Look at the use of five, eight and ten frame equipment and using deep and medium frames, as well as combinations of the two.

Look at honey extraction using movable frame combs. See how the strength and durability of the comb is an essential part of the success of

this hive design. Note how the frames may be moved to other hives to boost colony strength and to make new colonies or nuclei.

Bee stings and protection.

Find drawings or photos of the sting structure of the worker honey bee. Point out the barbed shaft of the sting, the venom sac, and the muscles that keep the sting pumping venom after it detaches from the bee and into the flesh of the sting recipient. Discuss how the loss of some bees due to defensive stinging is cost effective for a social organism, and how this deters further predation by various predators, from birds, toads and mammals (including humans, bears, skunks). Note how this is less effective on hard bodied animals like other insects, and how predation by dragonflies and spiders occurs at a low level.

Find a clear summary of how been venom works, and how it is quite different from other social insect venoms. This means that a beekeeper may have little reaction to honey bee venom, but become quite sick after being stung by yellowjacket wasps or hornets.

Look at some of the hats, veils and bee suites beekeepers wear to protect themselves from bee stings. Discuss how some beekeepers use little protection once they are familiar with bee behavior.

The Smoker, how it works and how to use it.

Look at the design of a typical bee smoker, with a bellows and fire chamber. Explain how these work, and the need to start from the bottom of the fire pot chamber to have long-lasting smoke. Look for other methods humans have used against bees. Discuss the behavior changes of using smoke: confusion of the chemical communication systems of bees and the engorgement of their honey stomach. Look at alternate methods of calming bees without smoke, including wet towels, moveable frame covers, fine water or scented water mist, and the advantages/disadvantages of each.

Class activity – In the laboratory or elsewhere

Look at a natural hive from a bee tree.

Obtain a natural bee colony abandoned by the bees (where they died naturally). With a large tree, this may require the help of a good carpenter or handyman. It may require a visit to the place where the natural nest is being stored so it is not destroyed. The ideal arrangement is a tree section that can be cut or split so the combs are exposed like leaves in a book, as much as the bees may have cooperated to let that happen.

Propolis on bee.

Carefully remove the combs from the outside of the nest. Have students draw a cross section of the hive, showing the attachment of the comb to the top and sides of the wood chamber. Look for communication holes that allow bees to move from one side of the comb to the other without walking a long distance around the comb. Identify the worker cells, the drone cells, and any queen cells. Look for the darkened comb where brood has been produced.

Comparison with a wasp nest (without wasps).

Obtain a hornet or yellowjacket nest that has been depopulated by short term insecticides, or wait to capture such a nest after cold weather has killed the inhabitants, and before predators or the weather had destroyed it. Using a sharp knife or razor blade, cut the outer layers away from the nest along a midline the students select. As in the honey bee chamber, note the attachment of the combs to the interior of the nest and locate the areas of young wasp production. Look for any remaining wasp larvae and pupae. Count the number of cells in the nest and predict the number of wasps that lived there. Handle these nests carefully if they have been killed by insecticides. Use lightweight, disposable gloves, and watch for new emergence of wasps from the brood that was sealed when the adult wasps were killed.

Assemble beehive.

Bee supply manufacturers offer starter kits for beekeepers. Look at these kits for purchase or decide to purchase your own starter kit to personal specifications. Following standard safety rules (eye protection)

Bee tree top of combs.

glue and nail the frames, hive bodies, covers, and bottom board together. I would not recommend using an air compressor for student groups for safety reasons. Insert the foundation, or use plastic frames. Paint or stain the hive to reflect you class's personality.

Economics of wood+wax vs plastic frames.

Compare the cost of purchase, labor and efficiency of use of plastic frames compared to wood and wax. Discuss the issues of labor savings versus the problems of disposal of old plastic combs compared to the disposal of wood and wax combs. BC

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Book

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Seeley, Thomas, Honey Bee Democracy

Vocabulary

Bee nest, nest volume, bee space, comb, honeycomb, brood comb, hive site selection, propolis, bottom board, brood chamber, honey super, inner cover, outer cover, frames, foundation, plastic honey comb, chewed wood nest, vegetarian, carnivore, smoker, fire pot, bellows, natural bee nest, L.L. Langstroth, nest site characteristics

Check out the new website **www.honeybeespeak.com**. This offers a matching service for folks who speak about bees and beekeeping, and the groups who seek their services. You may sign up both as a speaker and as a person who will receive notices of speaker activity.

January is time for the Serious Sideliner Symposium, held as part of the American Beekeeping Federation Convention in Hershey, PA. The SSS is held on Thursday and Friday of the convention. If you are a small scale, sideline, or semi-commercial beekeeper, come and join us for the two-day event.

Two new Wicwas Press titles are *Beekeeping Equipment Essentials*, by Ed Simon, who has written for *Bee Culture*, and *Bee-sentials: A Field Guide*, by the author of this article. Go the PayPal bookstore at **www.wicwas.com** for further information.

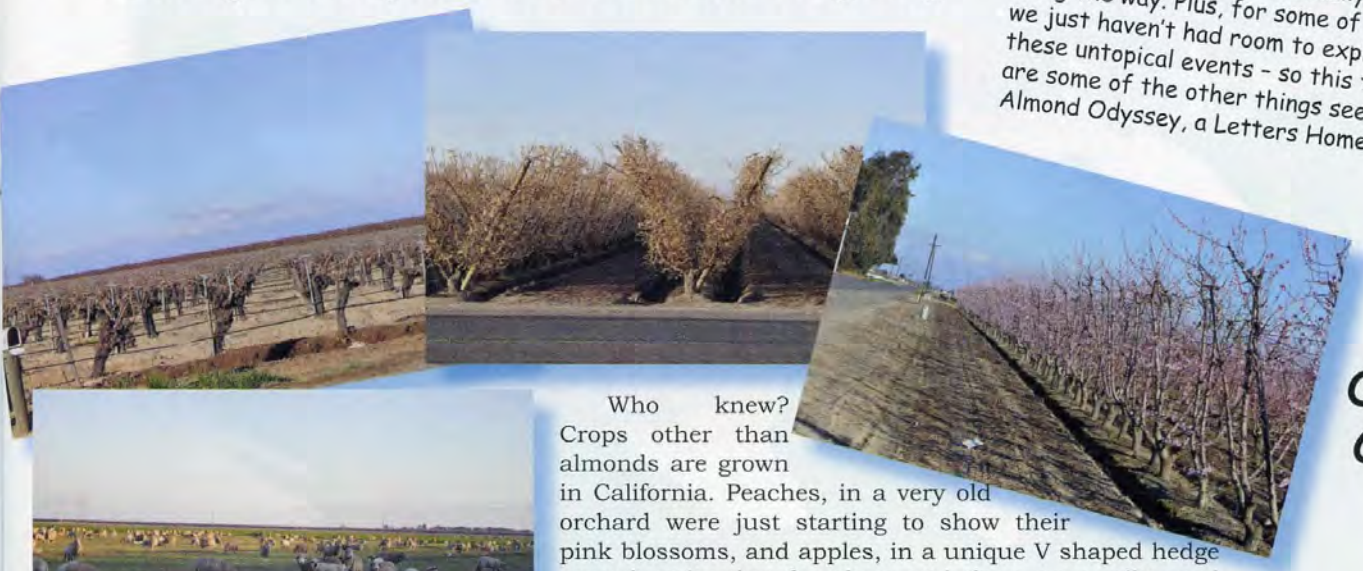
Kim **Flottum**

Letters Home

More photos from the Almond Odyssey

Photos by Kodua **Galieti**

There were lots more things than almonds during the odyssey, though there were certainly a lot of those and those things kept rising on the horizon, or showing up unexpected, or were actually planned along the way. Plus, for some of the articles we just haven't had room to explore some of these untopical events - so this time, here are some of the other things seen on the Almond Odyssey, a Letters Home story.



Other Crops

Who knew? Crops other than almonds are grown in California. Peaches, in a very old orchard were just starting to show their pink blossoms, and apples, in a unique V shaped hedge weren't quite that far along and there were miles and miles of grapes, everywhere. They are slowly replacing the old standby cotton because they are so much more profitable – mechanical harvesting, custom pruning crews and because it's dry, less spraying than other locations. Sheep were the last thing expected, but suddenly around a corner there were thousands and thousands of them.

Hundreds of beekeepers go to the almonds. And almost all of them provide some sort of identification on their hives or pallets. What would you think of a poster, with a hundred or so of these – The Beekeepers Of America? Maybe yours is in the bunch.

Randy Oliver

There wasn't room in last month's article for any photos of Randy Oliver, so we'll share a few now – starting with the fact that you can just sit and chat – he's not rapid fire all the time – and what you'll hear is always instructive. We examined a lot of colonies – the supercedured colony is typical he said when things start to go wrong in a colony – virus, Nosema, nutrition...all contribute. We spent a short while making up nucs to sell from colonies not strong enough to go to the almonds.

Other Places

History and people were also on the agenda. The California Gold Rush was possible because people could get across rivers...at places like Roberts Ferry. Stage Coaches east to St. Louis and beyond crossed here, and miners, from the coast heading to the gold fields did too. James Dean died on one of the roads we traveled on, and nearby, the last place he stopped for gas makes a big deal of it. Meeting with scientists from Eurofins, a European Research Company, for lunch with U.S. Headquarters in North Carolina was on the agenda. Jessica Lawrence, beekeeper, tatt wearer and tatt author this month was one of the scientists. Others were from Germany, Argentina and California. And a beekeeper's meeting! The Central Valley Beekeepers held a meeting, and we went. I even got to speak for a bit.

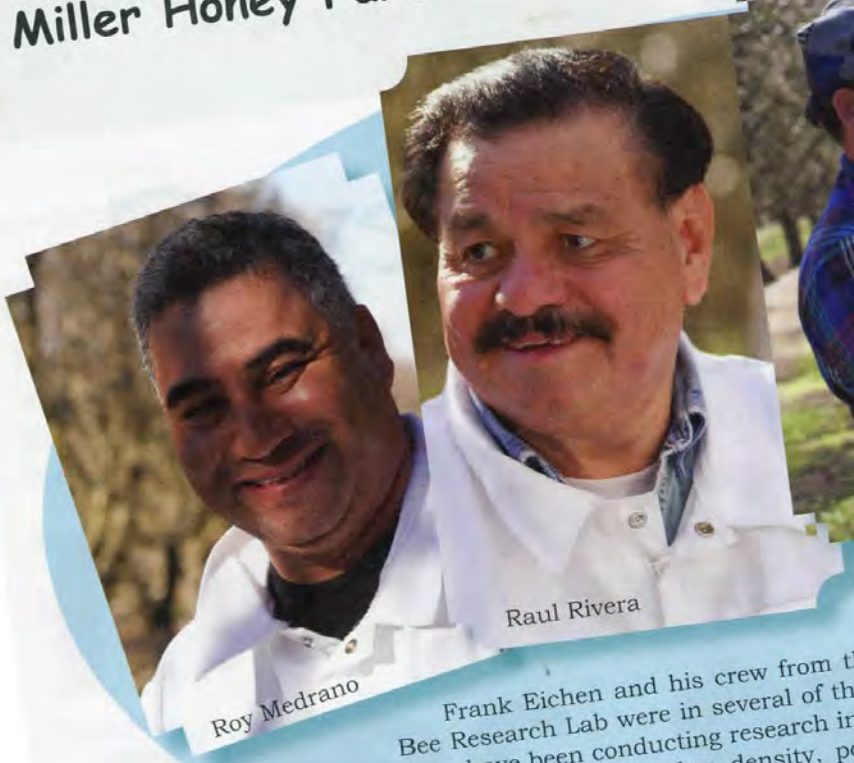
Jeff Anderson (L) from Minnesota and Darrin Cox from Utah were in the orchards looking at crashed colonies. Were these suffering from CCD? Hard to tell but this is what the ground looked like in front of some of the hives. On a pallet, three would be strong, eight or 10 framers, and one would be down to three frames and shrinking fast. And every last one looked like this close-up – tongue extended. Dead.

You can't get away from pesticides. Spray tanks, airplanes and copters are always somewhere nearby.

Pesticides

We're going to do the Miller Honey story later yet this year, but I just couldn't resist these. There's a bridge over an incredibly deep gorge in the town John lives in. Apparently it's a popular place to take that last step off of...so they put a phone up there for desperate steppers. Manzanita produces a good honey, blooms for a long time, and is nearly everywhere in this small part of the world, and this is the flower. John runs a tiny clemintine orchard on his property that gets a little attention between honey crops and pollination gigs. This is the bench his crew uses to scrape boxes. The material falls or is pushed through into a box below that sits on a pallet. It's neat, clean and easy. Smart, John. Once the frames are cleaned nucs are made up, waiting for the bees to return from the almonds. That's a story for later.

Miller Honey Farm



Roy Medrano

Raul Rivera

Henry Graham

Frank Eischen

Weslaco Researchers

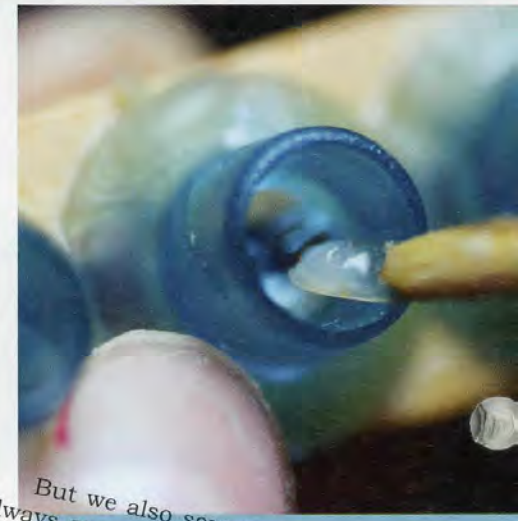
Frank Eichen and his crew from the Weslaco Honey Bee Research Lab were in several of the orchards visited. They have been conducting research in California for several years, looking at bee density, pollination efficiency and the like. With the Weslaco lab slated to close sometime soon, the future of these projects is uncertain.

Olivarez Queens

Olivarez Honey Bees was on the agenda, and the story from a visit there is still to come. This is the office staff – the folks who take your orders and make sure they get sent.

Back row L to R – Ray Olivarez, Jr., Cassi Davis, Gloria Fuentes, Donna Grundy, Erika Ordaz, Craig Salvagno
Front row L to R – Christina Paschall, Tammy Olivarez
The pooches are (L) Boo Olivarez and Blue Olivarez

But look at this trailer – this is what they haul packages in all the way to the east coast – air conditioned, lots and lots of sensors, excellent ventilation and very, very big.



But we also saw grafting going on – I am always amazed at how fast and how accurate these ladies are. From there to the starter and finisher colonies, and this is what you see after a few short days – more on their operation later this year.

The almond flower that doesn't need honey bees isn't a reality yet, but Independence, the variety that doesn't need another almond tree is. This is where it comes from.

Independence

I couldn't resist!

Toni Burnham

photo by Ian Bens

URBAN BEES • EVERYTHING OLD IS NEW AGAIN

Eight Summers ago, with a vow of secrecy and at least a little shiver of "How cool is this?!" I became an urban beekeeper. Like many an urban dweller before me, it was impossible to believe that anyone else downtown had ever taken up a hive tool, wondered over the miracle of *Apis mellifera*, and hidden from the neighbors.

Hah!

Washington DC has had a Smithsonian observation colony since the Reagan administration, and long before my generation discovered the joys of "going green," the survivors of Woodstock built city hives and chicken coops. They, too, vowed that they would change the world, save the planet. They, too, stumbled over problems with their bees drinking heavily in a petrified neighbor's yard, and how hard it got to keep hives alive.

Most of that generation gave up the bees, but it turns out that survivors remained, tucked in shady lanes near Rock Creek Park, some likely wishing that I would shut the heck up when nattering on about all things city-bee where people could hear. Some of them gave me their old equipment when their kids cleared out the house; some of them gave me the cold shoulder when asked to come out and talk. Some of them started presenting to their neighborhood garden clubs, and teaching at their grandkids' schools.

This seasoned generation is different from me, and even more different to the folks a few years behind me, who are flocking to beekeeping with great enthusiasm and hope. The newer beekeepers can learn a lot from those that have been tested by time, while also building a community that might last this time – perhaps if we are not too "successful" too fast.

This hive lives on top of the Trinidad Recreation Center, and the colony inside was caught on a Capital hill doorstep by Kelly Melsted last May. They are rocking' the park! (photo by Kelly Melsted)

Can we admit this? Beekeeping is poorly suited to becoming an urban *fad.* It might seem obvious that bringing 50,000 stinging insects into a densely populated area requires education, thought, and careful planning, but trendiness and a very sincere desire to be on the right side of an environmental catastrophe are powerful prods to immediate action.

Beekeeping is, however, very well suited to becoming part of the *structure of urban life.* Archaeologists have unearthed urban apiaries with more than 100 hives in old Judean cities, London bees are healthier and their honey more varied than their country cousins. Here on the East Coast, urban tree canopies can be 100 years older on average than their suburban counterparts. And the world is only becoming more urban, making us downtown beekeepers pioneers in creating sustainable, nourishing green spaces for huge numbers of humans.

And so on. We all know about the amazing contributions of the honey bee, in cities and elsewhere (or we would not have this magazine in hand). The clustering of people in dense environments seems more and more inevitable with each passing decade, making urban settings the new "natural" for us.

What we might try to learn from the folks who have survived several decades downtown is astounding: how do they manage water sources and swarm control? Whom do they tell about their bees (if they tell anyone) and how do they do it? What changes have they seen in bee behavior and forage, in the way the urban greenscape works?

But there are a few things they might learn from newer beekeepers, as well. Like how not to go it alone, and how to own their rightful space in the urban biosphere. Here in my city, there are beekeepers who've been at it for over 20 years and never thought there was any point in trying to change a regulation, or even its interpretation. Today, we newbees are working with the Department of Parks and Rec on public hives, and teaching the guys who take care of our urban trees how to look after the feral colonies they find there. And there's a hive at the White House.

Because even though people, including urban residents, tend to think of cities as the *opposite* of a natural environment, our communities are no denser than a beehive or an ant colony, and just represent a different kind of habitat. Keeping bees made that completely obvious!

We had lived here for over 15 years before the bees arrived, but by the end of the first Spring, it seemed like we were in a completely different place. The weather was a key part of every moment, and the green world suddenly became an incredibly varied and dynamic neighbor. In late May, for the first time I smelled an immense, almost too-sweet smell, the Basswood bloom that extends our nectar flow two weeks beyond the one in the 'burbs. Was 2005 the first time the Basswood bloomed, or the first time I was actually growing in the place I was planted?

What urban beekeepers need, however, is a law to which we can point that says "Bees belong here" and getting that takes a community: a community that takes responsibility for itself. Urban beeks have a unique responsibility to both educate themselves and the general

public on a constant basis to ensure the welfare of people *and* bees, and to create a sustainable balance between all parties that amounts to a healthy shared habitat. If we don't participate, react and adapt, we will not survive. That's nature, folks.

Sometimes the technology that creates a beekeeping community may not help with building a real one on the ground. Message boards, Facebook, blogs, and tweets have all helped younger beekeepers find each other. And to find mentors and outyards and queens and bee vacs and lots of advice. Has it helped you find someone who will help heft hive bodies during a mid-season inspection, though? Do you know anyone from a nearby zip code with whom you can compare notes on this season versus last? The diversity and variety of your *local* beekeeping information is just as important to the health of your hives as genetic diversity is to the future of the honey bee, and I worry that relying too much on easy online investigating stops us from acting like the social animals for which we are trying to care. I follow beekeepers from all across North America, but I call up Pat, Wayne, or Marc when I am trying to make heads or tails of the MidAtlantic.

Though Craigslist and YouTube have revolutionized our access to gear and information, they might leave us just as isolated as a closeted beekeeper. Just eight years ago, there was much less information about beekeeping online, forcing me away from my comfortable and convenient keyboard and into the arms of a nearby beekeeping club. I learned directly from people who never would have crossed my path in any other way, and who pounded home the fact that all beekeeping is local, and that this is a kind of learning that cannot be done only from a desk chair.

At present, you can see any technique, from the cutting-edge to the cockeyed, via a YouTube video, and get detailed feeding and wintering advice from places you have never been. While installing a package seems pretty straightforward wherever you might be standing, I worry a lot about harvesting timelines from another latitude, and sworn cures for whatever ails your colony cooked up in an amateur kitchen. You can order a hive, stocked with bees and delivered, without even opening a book. And it's your right to do so.

Finding your info, gear and bees online can cut you off from shaking the hand of beeks who make them or raise them, however, or even knowing which stuff works best in your neighborhood. I would not have known which end of the hive tool was which if David had not shown me. One of my first two queens failed on installation, which I would not have realized (and addressed) without MaryEllen standing by my side. Larry made me a queen spotter, and Scott showed me how to chainsaw a bee tree.

Kids, make sure you get offline sometime. That's where the bees are.

Reconnecting with nature and tradition has continued to create both amazing and amusing moments. The honey bees are an ongoing revelation, with every door opening another, from understanding the conversation that happens between flowering plants and pollinators to learning just what to do with all that honey and beeswax.

Being the crafty sort, soap making appealed to me, and I eventually got very enthusiastic and started teaching this seemingly unusual "lost" art to other goggle-eyed members of my generation. But one session at a club

This is Scott Secomb showing me how to use a chain saw to rehive bees from a beautiful bee tree from Garrison Street NW, saved from the log chipper by the tree guys, Kate McLynn, Joe Ozik and me. (photo by Maggie Mills)

Ultra-cool construction workers at a site near Nationals Park stopped work this May and gave two of us a lift in a front end loader to rescue this 10-pound swarm. The bees now live in a mighty hive at a community garden near the Washington Hospital Center. (photo by Jim Amerault)

meeting included a woman of a certain age, a person who grew up when the suburbs were actually farm towns, and she rolled her eyes and said, "I just HATED soap making day each year when I was a girl!"

Just because my peers and I had no previous connection to this craft did not mean that the tradition was lost in the fog of time, or that it was some kind of enlightenment. The continued wonder of every personal beekeeping discovery actually means we are sharing with centuries of good people who have come before. We are showing our predecessors how to do it in new places and with different priorities, using digital tools to communicate and collaborate, and to make a place for beekeeping in our shared future. We should consider listening carefully to them, too.

Please do refer to the many articles that appear here and elsewhere about thoughtful and neighborly beekeeping, because your fellow city residents probably won't see this as an obvious continuation of a long human trend. Please maintain your sense of wonder as you chart your personal course through the expanding universe of bee-human information and interaction.

And please place your own beekeeping efforts in a context that extends community-wide into healthy ecosystems for all urban living things, back in time through shared human knowledge and practice, and forward into a future where bees and humans continue to live and work side by side. BC

Toni Burnham is an active urban beekeeper in the DC area.

Marketing Honey

Ted **Dennard**

The Basics, From One Of The Best

If you bottle honey, you have a responsibility to the honey bees to represent their product as the high art form it is. The bees visit more than two million flowers to make a one-pound jar of honey, and you're going to put it in some sticky, crappy plastic bear or jar with an awful label? Come on! If that's the best you can do, give us all a break and sell your honey in bulk to someone else who can do it right.

The Basics

1 Use attractive, sticky-free jars. Choose a container that stands out. And make certain there isn't ANY honey on the outside of the jar. The jar might look good and clean when you box it, but if honey got into the threads of the lid, that little drop of honey will slowly work its way out from under the lid and down the jar.

2 Create a label that transforms the product into something more than just honey. Above all, when creating a label for your honey, aim high. Dispel the notion that honey is a plastic bear full of crystallizing nastiness on the grocery store shelf. *Honey is nature's precious gift to us; market it as such.* Don't just call it "honey." That's lame. Call it Tupelo Honey (if it truly is), Spring Honey, Roaring River Gorge Honey, Charleston Honey, Luscious Honey, Heavenly Honey. Using descriptive words such as these will get people to make a strong emotional connection with your product.

3 Tell a story. Your story. The plant/flower's story. Tell any story, as long as it's good. Romanticize your product in a way that will endear a buyer to your brand instead of someone else's.

4 Connect with the customer. Let them know this is real and authentic and born of passion – both yours and the honey bees'. People want to feel like they know who they are buying from. If you can elicit an image in their head of happy bees feeding on pristine flowers and of your caring love for the bees, then they will want to support you and those bees.

Selling

There are many ways to sell honey. Sometimes I think there are too many. I've got so many different ideas of how to market honey that I just can't seem to focus on one and do a good job. Honey is good for so many things. Pick one or two angles and really dig in to that particular market. Your angle could be health or athletic performance; in that case, throw in some bee pollen. Maybe you want to approach the food service industry through local restaurants and diners. Or you can try to get into grocery stores. But don't associate your product with the cheap stuff on the shelf. Instead, get placed near or on the counter. Maybe you want your focus to be the local aspect of your product or the story you are trying to tell (see No. 3 above). Savannah Bee Company sells honey in specialty food

stores, antique stores, spas, high-end boutiques, flower shops, etc. If you perfect your packaging and project the right kind of image, then really, the sky is the limit on who will sell your honey.

Display

When showing your honey at a trade show or a craft fair, do NOT have a folding table covered by a table cloth and plunk your honey jars on top. Use towers of bee boxes and place an old door on top of them to create and interesting and rustic table. Put your jars of honey on a raised stand and backlight it to make it glow and to show off the different colors. WOW them.

Make your handouts attractive with a quality image of a bee digging into a flower or of some sort of natural setting. It doesn't have to be a photo of your bee yard, but it does have to be a nice looking, natural, clean picture. (When photographing bees, it's very hard to get them to not to look like flies, and flies don't help sales. So make sure your bees don't look like flies.) Also, don't clutter up your handout with a bunch of dense copy. Instead, separate text into shaded areas or boxes to help the reader easily navigate the information. Nobody is there to read a text book, so be concise.

Encourage people to try samples of your honeys. Lead visitors through a tasting and tell them all about the different varietals, where they come from, why they are different, and describe their tasting notes and what each honey might go best with. It helps not to be boring. Engage people in real conversation. Make them laugh. There's nothing more awkward than having a stranger silently stare at you while you're eating, or worse, pretend you're not there.

Give honey a use. Let the customer know at least one way to incorporate the honey you are selling into their life. Something like the following will go a long way: "This one is best for tea or coffee because its light taste won't interfere with the flavor of your drink." "This honey is for drizzling on meats and vegetables on the grill." "This honey makes the best honey butter." Don't just make it up. Try different recipes and then your real enthusiasm for the described dish will carry over with passion.

Many people don't know how to use honey, so it sits on a shelf and begins to darken and granulate. Don't let this happen! Teach people how to use it up. Transform honey from a commodity into a luscious ingredient, something that you add to a meal to improve it.

Lastly, don't go to all the effort to make honey, bottle it and market it if you aren't going to charge accordingly. If you don't value your honey, then the customer won't either. The rule of thumb is to raise your prices until you get "pushback," which is a resistance from customers to pay the amount you are asking. Think about what people pay for wine. They shell out 20 bucks and drink it in an hour. But that wine elevates their meal to something grander, something romantic. It's your job to bring honey into this same realm. "Calling all beekeepers! It's our job to lift up the honey world!" BC

Ted Dennard operates Savannah Honey, probably the most innovative and enterprising honey producing and packing companies in the U.S.

using facebook

Jessica **Dally**

If you are in business using Social Media is a must. Get started, or get better here.

In the August 2012 issue of *Bee Culture* Magazine Dan Conlon wrote that a small honey producer can "develop a personal relationship with customers that results in repeat purchases, earns their loyalty, and they will provide your best advertising by telling their friends and family to buy your honey." And certainly that advertising is where social media like Twitter and Facebook become important to beekeepers as we try to set ourselves apart from what our customers can find on the grocery store shelves. Even if you're not selling honey commercially you may be interested in using social media to connect with other beekeepers or to promote your club or organization. With 2/3 of the population participating in social media, it can be an extremely useful set of tools for marketing your beekeeping business or group.

Clearly Facebook is the largest arena to find customers. But how does Facebook work and how would you use it for your business? In the next few months we'll discuss how to use Facebook and Twitter successfully for your business but for now let's start at the beginning.

How do you get on to Facebook?

The first thing you'll do is register at www.facebook.com. Once you've put in your basic personal information the site will ask you for other information like other email accounts and your high school which will help Facebook find people you may know. It will also ask for a picture of you which helps others know they've found the right person. If you're uncomfortable putting in your information you can simply skip these steps. Respond to the confirmation email Facebook will send at the end of these steps and you're ready to start using Facebook.

What do you post to Facebook and what shouldn't you post?

This will really depend on how much you want the world to know about you. Keep in mind that you might already be "on the web" and a simple Google search of your name will inform you about your current information on the internet.

Security settings in Facebook including who can see the information posted on your page can certainly help to keep your private information fairly private but you still shouldn't post anything you'll regret later. One way to look at the internet is to assume that anything and everything you put on the internet is public, be it a YouTube video you think only your family will see or an update or photo on Facebook. So don't put private personal information out there and don't post pictures that you wouldn't want the world to see.

So how often should you post on Facebook?

This too will suit your personal style but if you post every five minutes for two hours you'll quickly lose friends. When you post something ask yourself a few questions:

1) Is it interesting, funny, bizarre or fascinating to a large group of your friends or followers?
2) Is it pertinent to those who know you?
3) Would you want to see this if someone else posted it?

An example might be "Laundry is done!" In general no one is going to care about that. But . . . post a picture with your newborn sleeping on the laundry or a pile of laundry so big that you're almost covered in it and people will find it cute or amusing. And to a large degree that is the point of Facebook. We use it to share the cute, scary, interesting and important parts of our lives with others without having to send emails that clutter people's inboxes. People don't want to know everything about you, but they do want to know the important things, so share them!

How do I find people?

If you entered all of the information Facebook asked for during sign up it likely found some friends for you. If you didn't enter that information you'll want to find people by searching for their name. If you're not sure you've found the right person, simply click on their profile to see pictures and other information that might help you confirm their identity.

For people new to Facebook there's also a button to the top right of the page called "Find Friends." As you might guess this will help you find friends based on your email address and people who are in your contacts.

One note, don't add every single person you might know right off the bat and certainly don't add every game or brand page you think you might like. Just like email newsletters or mail catalogs if you sign up for everything you'll quickly be overwhelmed by the sheer amount of information you're receiving. You can always add more people later as Facebook becomes more familiar to you.

But my friends are driving me crazy with their endless posting!

No matter who you are or how selective you are with your friends you will still have a few who post things that are either offensive, incongruous with your viewpoint, irrelevant to you or simply annoying. You'll have to overlook the occasional post that you don't like (your friends are doing the same with your posts!) but what can you do about that person who posts nothing but video game results to their page?

Well the good news is that unlike our regular lives there's a number of ways to handle these things from the fairly passive to the extreme. Here's a look at some of your options:

1) Change the settings for your friend. Find your friend and click on their profile. From there you'll see a box that says "Friends." Hover your mouse here and a drop down shows up. Choose "Settings" and you can change what you see from this friend. This is a great way to customize Facebook to suit your needs. Hide the posts about games people are playing or make sure you see everything someone posts, the settings for either are on this menu. Do this for friends who annoy you a bit but not enough to unfriend. Your friends will have no real way to know you've done this so you can customize as much or as little as you'd like.

2) Unfriend. This is just like calling off a friendship anywhere. If you share friends they may still show up here and there in comments to friends or in pictures other people post but you'll no longer be directly connected to them. You'll want to be careful with this one as it can be offensive to the person you've unfriended. The unfriend option is in the same menu as the settings option. Use this wisely.

3) BLOCK! Have a person that you want to wipe from your life so you never see them again? Well then blocking is for you. You won't see them in a search and if they comment on a friend's post you won't be able to see their comment. They're gone! And if you change your mind you can go back to this same spot to unblock them. Hopefully you'll not need to do this at all but it can be helpful for that one truly disruptive person.

But what about my business?

So now you've created your personal page but if you're running a business you'll likely want to create a page for that business. This helps you separate your personal life from your business life and insure that you can post information for your friends without having every fan of your business see it. Pages, unlike people, don't require you to approve fan requests. This means you can grow your fan base without you having to approve each person.

You'll create your page here: **www.facebook.com/pages/create.php** and later we'll talk about building a page for your business or group.

Responding to Posts

One of the biggest mistakes people make is responding or posting in strange places. With all the ways you can interact with others on Facebook it's not that surprising that a newbie might make this mistake. Here's the ways you can interact with others and what it means in terms of other people seeing your posts.

1) Wall- Everyone has a wall. When you post your own status update it goes here. You can find a friend using friend search and write on their wall. This type of writing is completely public so you'll want to make sure what you say here is appropriate for everyone's eyes.
2) News Feed- This is where you see what others have posted to their walls. The things your friends post on their wall will show up in your news feed and the same is true of any companies you've decided to "like." If you see a post from a friend on your news feed that you like or want to comment on you'll do it directly under the post. Don't go to their wall to post a comment or they won't know what you're referring to. This is similar to replying to an email chain . . . take out the original email and the context for the response is lost.
3) Messaging- There are two types of messaging on Facebook and in general they work together. If a person is signed on to Facebook they will see your message immediately in a pop up window. If they aren't online the message will show up in their inbox. You can message someone in a number of ways but the easiest may be to click on the message link on the upper right hand side of your screen. Find the Facebook logo and next to it you'll see three icons.
   - Two heads- this is where you see folks who have requested to be your friends.
   - Instant Message Window- this is where you go to send emails or instant messages.
   - World- this is where you see when other people have responded to your posts or things you've commented on.

How often should I check Facebook?

When it comes to your business page you'll likely want to check every day or every other day. Essentially it's just like email and people will expect a certain amount of timeliness to their comments and posts. For

your personal page it's really up to you how often you want to log in, but if you only log in once a month you might well miss that impromptu family gathering or not notice the cute new pictures of your friend's kid or grandkid. When you log in look to the top left side to see red boxes of people who have responded to you, asked to be your friend or messaged you.

Photos

Photos can be one of the best features of Facebook and certainly for business pages they get the highest response from customers. These can be the easiest way to show what's going on in your life or in your business. But like the old, bad slideshows of the past, do everyone a favor and post only the best photos you take, not every little thing. And do make sure to put in a caption so people can tell where you were, what you were doing or what the picture is about!

We'll talk more next month about best practices for running your business page and how to use Facebook to market and bring in money but for now one of the best things you can do is go onto Facebook and take a look around. Make a note of what you like and what you don't like. Then when it comes time to really build out your own business page you'll have some good ideas of what you'd like to do.

Still Confused?

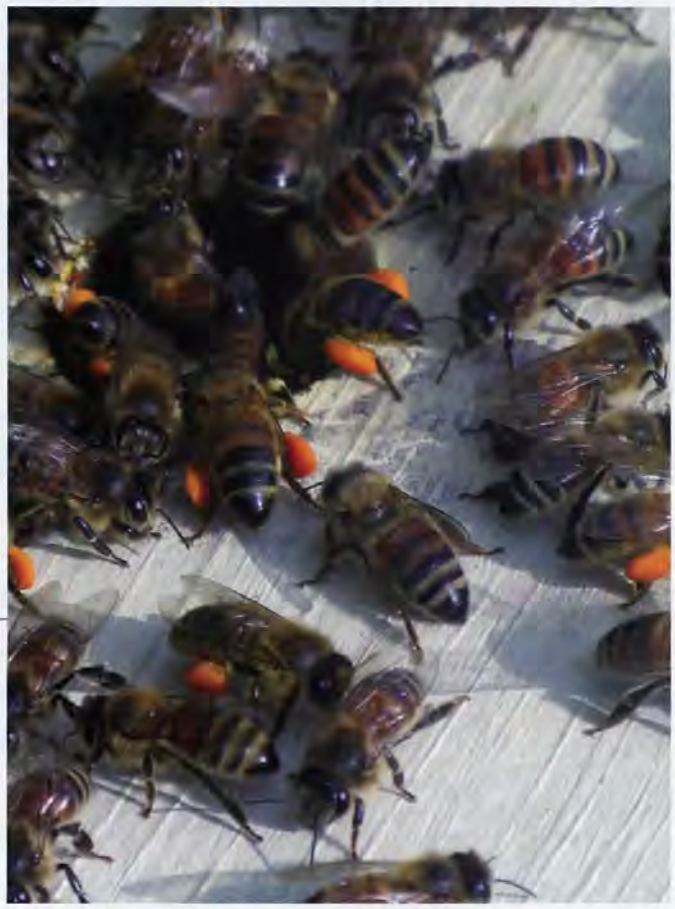
It's not you, Facebook is confusing at first! If you're still confused ask others for help. Every other person on Facebook was in your same position at some point, so don't be intimidated. With marketing moving more and more to social networks the potential positive impact on your business makes it too important to pass up. BC

Jessica Dally is a professional in the social media business, running the social presence for Wildlife Media (Chris Morgan Wildlife and BEARTREK), World of Beekeeping, Seattle Free School and recently assisting with the Puget Sound Beekeepers. She has worked with TechSoup, an international nonprofit, assisting and teaching other nonprofits on the use of social media.

LESSONS GLEANED

Ross **Conrad**

Ancient Wisdom Of The Honey Bee Part Two



Last month we explored some of the hive's wisdom, starting with what the bees can teach us about ourselves, and then moving to what we can learn from observing the bees. This month I would like to continue to look at the actions of the honey bee and based on my readings of the hive, here are some more of the stories they tell and the lessons I have gleaned from the bees.

Of all Earth's creatures, great and small, the honey bee is one of the few, besides humans, that will regularly take more than it needs. As long as there is nectar that can be gathered and room in the hive to convert it into honey, a colony will continue to store honey in the hive even after they have gathered more than they need to get through a Winter dearth. Unfortunately for the bee, this excess honey is prone to being robbed by other critters, bears, or beekeepers. The lesson the bee's teach through their hoarding is to not take more than you really need or else run the risk of having your excess taken by others.

Once the Winter's honey is stored away and the cooler days of Autumn herald the coming of Winter, the workers' seem to sense that the abundance of nectar-bearing blossoms will not return anytime soon, and that a long dearth of honey will befall the colony during the frozen months ahead. Practical gals as they are, they realize they have to make the most of the honey they have gathered during the Spring, Summer, and Fall, stretching it out until the following Spring. At the same time, they recognize the drain on their collective efforts that the drones represent – given that the drones do not work in the hive, have no stinger to defend the hive and do not forage for anything that the hive needs. Thus, the worker bees can be seen every October preventing the males from gaining access to their honey stores, driving the drones from the hive, and blocking their reentry. Between the lack of food and the energy expended in vain trying to resist the female workers from throwing them out, the poor drone in its weakened state gets tossed out into the first snow of the season, only to land on its back and buzz dejectedly as if to say, "But sis, what about all the good times we had?" Unfortunately, the drones, like all honey bees, cannot survive for long on their own outside the hive, especially in cool weather. Thus, the lesson we can learn from the drones is to consistently carry our own weight and always contribute in whatever way we can to our family and community, so that we are not looked upon as expendable dead weight during difficult times.

One of the things that may prevent us from contributing is not knowing if our efforts will make a difference. There are so many challenges we are facing these days, both large and small, it is easy to think that our individual efforts being so small in the grand scheme of things, are insignificant and simply do not matter. Lucky for us, the honey bee does not fall for this illusion.

Consider that in its entire lifetime, a worker bee is estimated to be able to gather enough nectar from flowers to make $1/12^{th}$ of a teaspoon of honey. So it takes 12 bees, working their entire lifetimes to make a single teaspoon of honey that you get to enjoy in your coffee or tea. $1/12^{th}$ of a teaspoon seems like a totally insignificant amount when you consider that during the course of a New England Winter, a hive will need to 60-100 pounds of honey in order to survive without starving, and that's just during the Winter. A hive in Vermont will consume even more honey during the Spring, Summer, and Autumn in order to help fuel all

the activities of the hive that must be accomplished during the busy season. As a result, the amount of honey a single worker bee contributes to the effort may seem so small as to be insignificant, and yet the honey bee does its part anyway. The bee will do what a single bee can do, and that bee trusts that all her sisters will do what they can do as well. The end result is nothing short of a miracle – hundreds of pounds of honey produced by a single hive.

It is from this example of the hive that we learn the true lesson of the cumulative impacts of one's actions. A single person burning fossil fuels in an internal combustion engine causes a very small amount of harm that seems totally insignificant for example . . . but when you have millions, and now billions of people creating the same tiny bit of harm, the cumulative impact is an increase of carbon dioxide in the atmosphere of over 35 percent compared to the past 10,000 years, which in turn destabilizes well established weather patterns on Earth within the relatively short period of time of just a few hundred years. However, just as the seemingly insignificant amounts of harm each of us do can add up to a force of geological proportions, so can the seemingly insignificant and small acts of good, healing, and nurturing that are done, all of which can add up to the reversal of the destructive trends we have seen evolve during the past few thousand years of human history. Think of the ancient cathedrals that took hundreds of laborers and craftsmen generations to build. Laborers who worked on these cathedrals each made a personal contribution which would account for only a small portion of the entire project and very often they never got to see the end result of their labors, but taken together their efforts resulted in the construction of magnificent structures that still stand centuries later.

Now some of us may be unsure what actions we should take in order to make the best contribution to our collective future . . . and here once again I look to the hive for guidance. As the honey bee goes about its day making its living by taking what it needs from the world around it to survive, it gathers nectar, pollen, propolis and water. These four things along with the air that they breath and the warmth of the sun that they soak up are all they need to survive, and in the process of taking these things from the world, the bee gives back more than it takes and harms nothing outside of the hive (unless threatened and forced to defend itself). Not so much as a leaf on a plant is injured, and yet through the act of pollination the bee gives back to the world and helps ensure that the plants thrive and are abundant, so that in turn there is an abundance of all different types and shapes of fruits, nuts, vegetables, and seeds to provide for all the other insects, animals, and us.

What a great and powerful lesson the bee offers us to work into our lives . . . to strive to go about making our living and taking what we need from the world around us in a way that first of all does the least amount of harm, and secondly leaves the world a better place because we took what we needed. Some call this concept "right livelihood."

When we take moment to reflect upon the lessons that the honey bees teach us, it appears that the wisdom of the hive (dealing with pain and fear, responsibility, cooperation and community, generosity, hoarding, the importance of our personal actions and contributions, and right livlihood) may be exactly what we will need as we forge ahead into the future. For example, we will need to learn how to face a world with an increasingly unstable climate that exhibits a greater number of violent storms and extreme weather events. This means more floods and droughts, hurricanes and tornados, as well as forest fires, all of which may threaten lives, destroy homes and property, kill livestock, and jeopardize our bees. Climate scientists report that even if we stopped burning fossil fuels today, the average temperature on the planet will continue to climb for about 30 years before it levels off and begins to drop. This means that things are bad and are going to get worse. We will have to prepare ourselves psychologically, emotionally, and spiritually to face the pain, fear, and suffering this situation may create as it plays out in our lives, and the lives of our colonies.

We will all need to step up and take full responsibility for our individual roles in aggravating today's problems and help to craft solutions that will start to address the climate crisis we face. Once we realize the cumulative impact that our seemingly insignificant actions can have, it behooves us to reflect on everything we do and make the changes necessary in our lives to reduce the level of harm we create while at the same time helping to nurture the solutions that are required.

We can't do this all alone. We will need to come together and cooperate with each other to rebuild our communities. As beekeepers, we have already proven that we have this capacity. Have you ever noticed that the people we meet at beekeeping meetings are from an extremely wide range of socio-economic and political backgrounds, varying religions, different ages, races, sexual preferences, etc. Normally we would probably not associate with these people except for the fact that we all have a common passion: beekeeping! By focusing on what we have in common we can accomplish much more than if we concentrate on our differences.

Above all, we will need to be as generous as possible and remember that each person we meet is fighting a tremendous personal battle. We will need to be gentle, but firm with each other and ourselves. Yes, the bees have much to teach us, but it will happen only if we open our hearts and minds to their lessons. BC

Ross Conrad is author of Natural Beekeeping: Organic Approaches to Modern Apiculture.

Sea Turtles & Honey

Kimberly **Button**

Believe it or not, the Gold Standard for fixing turtle injuries is . . . honey!

It is a tough world for wildlife of any shape or size right now. Though tiny honey bees have their own trials, it might also be surprising that massive sea turtles are facing species-threatening tribulations of their own, too. Thankfully – and surprisingly – each can help the other in their own survival.

At the Georgia Sea Turtle Center on Jekyll Island, Georgia, an innovative program has partnered local beekeepers with the state's only sea turtle rehabilitation center in an effort to save as many of the endangered marine animals as possible, while bringing attention to the curative powers of honey.

Sea turtles live in warm tropical waters, especially the waters off of the Atlantic coast in the southeastern United States. There are seven species of sea turtles, and six can be found in the U.S. Those six species are all considered endangered under the Endangered Species Act. Though sea turtles spend their lives in the ocean, the females must make the long and perilous trip back to the beach to lay eggs. The mother's journey is just one of the hazards that is threatening the existence of sea turtles. Loss of nesting areas along the coast, where tourism is constantly gnawing away at natural beach habitats, is a major factor in the loss of sea turtles. Many animals are also hit by boats or entangled in marine debris, either immediately killing the animal or resulting in emaciation over time.

When sick or injured sea turtles wash ashore or are found in ocean waters, they are brought to a sea turtle rehabilitation center. At the Georgia Sea Turtle Center, part of their treatment just might include the use of honey.

Dr. Terry Norton, DVM is the Director of the Georgia Sea Turtle Center and has provided veterinary care to a variety of species for decades. He had used honey with some success on other animals, so when the Georgia Sea Turtle Center opened in 2007, Norton decided to try the use of honey with sea turtles, as well.

"There is a lot of literature on the benefits of honey in wound care," Dr. Norton said. "The three major effects are that it is acidic which aids in killing bacteria and fungi; it is hyperosmotic so it pulls debris out of the wounds; and the bee injects an enzyme into the honey that converts glucose to low levels of hydrogen peroxide. The enzyme is activated when the honey hits the tissue and the pH is elevated."

Other positive effects from the medicinal use of honey, according to Norton, is that honey can enhance the immune system of the sea turtles, has anti-inflammatory properties, has antioxidant capacities, and stimulates cell growth.

Of course, honey is not the only treatment used at the Georgia Sea Turtle Center, but it is popular. "Honey is commonly used," Dr. Norton said, "but we will often employ multiple strategies throughout the healing process, such as Wound Vac Therapy, bone cement impregnated with antibiotics and silver products."

Not only did Norton decide to use MediHoney, which is a packaged sterile honey well known for the treatment of severe burns and diabetic wounds that are not healing well, but he also turned to his neighbors for help, too. MediHoney comes from the Manuka Tea Tree in New Zealand, and, according to Norton, is "the gold standard for medicinal honeys." However, he found that the products coming from local Georgia beekeepers worked great at healing sea turtle injuries, too.

"We started working with local beekeepers to get honey that hasn't been heated or micro-filtered, like you would find in grocery stores, because you want those enzymes," Norton said.

One of those many local honey producers is the Savannah Bee Company, headquartered in Savannah, Georgia. What started as a small home-based business with a passion for making great honey has become a much larger operation with four retail stores, two lines of honeys and a luxury beeswax-based body care line.

Ted Dennard, President of Savannah Bee Company, is passionate about helping others, especially after his formative time with the Peace Corps teaching beekeeping to farmers in Central America. With the Georgia Sea Turtle Center is his own backyard using honey to help the endangered sea turtles, Dennard wanted to help with his own honey.

"The Georgia Sea Turtle Center came to us for the honeycomb," Dennard said. "As soon as I found out that they were using honeycomb to treat sea turtles, I loved the idea of doing anything with them."

The Georgia Sea Turtle Center uses honeycomb to pack the wounds of sea turtles, especially boat strike injuries. Approximately 20 percent of sea turtles that come into the center for treatment have been struck by a boat, which creates quite a need for honeycomb. Norton said honeycomb has been used successfully in several severe boat strike injuries, with the honeycomb usually being kept in place by a waterproof bandage. Honey is also used to treat the wounds and other medical maladies. For instance, sea turtles brought into the center suffering from low glucose levels are often given the honey orally.

The use of honey at the Georgia Sea Turtle Center is becoming more widely known, as the Center works on

A see turtle with a major laceration on its shell is treated with packed honeycomb in the wound to aid in healing.

The Bee Buddies Honey financially supports the rehabilitation efforts of the Georgia Sea Turtle Center.

An injured sea turtle has honey applied to its wounds.

MediHoney is just one of the forms of honey used by Dr. Norton to help treat injured sea turtles.

their public outreach programs and informs visitors of all aspects of sea turtle rehabilitation. Interactive exhibits and daily presentations are available to visitors, where they can meet the patients in the turtle hospital, see them being fed, and actually listen in as patients are being seen by the veterinary staff and hear what kind of treatments will be used – including the use of honey.

The process of getting the honey to the Georgia Sea Turtle Center is a collaborative effort among the coastal communities. Jekyll Island is an hour away from Savannah, so Dennard often sends back buckets of honey with his dad who has an office in Brunswick, an inland town close to Jekyll Island where the Georgia Sea Turtle Center can pick up the honey. Sending honey products by mail is also another alternative.

It is not just the honey and actual honeycomb itself that is necessary to treat the sea turtles, though. The process of trying to rehabilitate a steady stream of injured sea turtles is lengthy and costly, and funds are needed in order to allow the Georgia Sea Turtle Center to be able to survive. The Savannah Bee Company collaborated with the Georgia Sea Turtle Center in a continuing effort to raise awareness and funds.

"They [The Georgia Sea Turtle Center] were kind of using honey to market things, saying, 'Hey, we're using honey to heal these turtles' and then people wanted to buy honey," Dennard said. "They approached us about bottling some honey and then we decided to come up with something."

The Savannah Bee Company was used to partnering with organizations to raise funds by selling specialty honey. Their BeeCause Honey donates a portion of the proceeds to organizations that benefit human interaction with nature, so the company created their Bee Buddies Honey. The local honey sports a bright green label with a sea turtle, clearly stating that the honey benefits sea turtle rehabilitation. Three dollars from every bottle is sent to the Georgia Sea Turtle Center. Bee Buddies Honey that is sold onsite at the Georgia Sea Turtle Center brings in even more money for the organization.

The joint partnership started in the Summer of 2011, and though the honey is typically sold in a limited geographical area, it has already earned more than $5,000 for the Georgia Sea Turtle Center from sales through Savannah Bee Company. Even more money has been raised by sales directly at the Center.

"We have four Savannah Bee Company stores and a website to sell the honey," Dennard said. "We have about 1,500 other wholesale customers, but by no means are all of them carrying Bee Buddies Honey. A lot of the Florida stores were interested because everybody down there is aware of sea turtles," he said, while other local wholesalers in the geographical area carry the honey, as well.

What surprises almost everyone, including Dennard himself, is the fact that tiny, flying bees are the only ones that can make what it takes to rescue and rehabilitate large, lumbering swimming turtles that weigh around 300 pounds as an adult.

"I think it is super special that we are crossing the boundary and the border from land bound insect to salt water animal," Dennard said. "I think it is so interesting and cool that honey bees are making something that is healing sea turtles. It's special and I love it. Whatever bees do is healing. They heal everything. They're good for the environment, they're good for the air and they support and maintain plant life. I could go on and on, but it is special."

For more information about the Georgia Sea Turtle Center, visit www.georgiaseaturtlecenter.org or phone 912.635.4444. For more information about The Savannah Bee Company and to purchase the Bee Buddies Honey, visit **www.savannahbee.com** or phone 800.955.5080. BC

Photos courtesy of the Georgia Sea Turtle Center.

Kimberly Button is a freelance writer in Orlando, FL.

NEIGHBORS . . .

Peter **Sieling**

Nancy and I used to live in a small suburban neighborhood with big yards. We got along reasonably well with our neighbors. Herb and his wife, Violet, lived on our right, Aurora and Lyle on the left. When the sun shone, Herb drove a huge riding mower. It looked like he'd mounted a recliner on it. It had thick, soft cushions and a big cup holder. Herb mowed every day. At dawn I awoke to the sound of a lawn mower and at night, lying awake, the headlights from his mower swished across my ceiling.

When Herb wasn't mowing, he was killing weeds and bugs with a big pump sprayer. He told me once he tried weeding his garden by spraying herbicide between the rows, but the vegetables didn't thrive. Now he runs a giant roto-tiller between the rows. He lays out his flower and vegetable gardens on a grid, three feet between each row, not a plant out of place, and not a weed anywhere. He suggested we spray our garden, which contains more weeds than vegetables, with herbicide. He offered to apply Roundup once in the Spring and again in the Fall.

Herb used to wave at me from his mower, until I got my first hive of bees. Back then, before *Varroa* mites, you didn't need to know anything about bees to keep them. My first hive swarmed and I added a second hive. The next year both hives swarmed two or three times and before I knew what had happened, I owned a small apiary, harvested hundreds of pounds of honey, and still knew almost nothing about beekeeping.

Herb didn't like my bees. He was concerned about them drinking from his bird bath. While he was leaning over the fence telling me all about bees and bee stings, he noticed the dandelions in my yard. He thought the wind was blowing my dandelion seeds into his yard. Bees do change your perspective on nature. I hated to mow the dandelions and Dutch clover in the yard until the end of the bloom. Then the grass was too tall to mow. I considered buying a brush hog and tractor to replace the mower. Although Herb quit waving at me when I drove past, he still called two or three times a year when a swarm landed in his yard. He told me he was just loading the pump sprayer with Sevin when they landed and I could either come get them or he would take care of them.

Aurora and her companion Lyle lived on our extreme left. Aurora wore long straight hair and peasant blouses. She loved me. I was the bee guardian and my bees pollinated her healing herbs. Sometimes she came to the door cradling a honey bee in her hands. "I found her in my crystal garden this morning. Is she yours? She seems ill. I visualized health and tried feeding her some honey, but she won't fly."

"Oh that's just Mildred again," I explained. "One of her antennae broke and she's forever getting lost. I'll put her back in the hive. Thanks." Some cruel facts of nature are too hard to explain.

I planted shrubs on both borders, hoping to conceal my activities. I passed out free honey. Aurora and Violet were appreciative. Lyle felt I was exploiting the bees. Herb used the adjective "regurgitated" and I pretended not to hear him.

Our last Winter in town didn't go well. Violet hung out sheets, towels and underwear on the clothesline to air one day in late Winter. My bees were taking their cleansing flight and spotted up everything in sight. Violet told Nancy that, well, bees will be bees, but Herb told me all about it with his face a beet red. Later he accidentally blew snow into our driveway while clearing his.

One hive contracted American foulbrood in the Fall. It died before I did anything and my other bees cleaned it out. By early Spring, my colonies were either dead or weak and full of foulbrood.

I asked Herb if I could borrow his pump sprayer. He wanted to know why, what I was putting into it, and would I clean it out when I was done?

"I'm putting down all my hives. They are dying of American foulbrood." Herb leaned over the fence to watch me dig a pit. He disappeared and returned carrying a shovel with an ergonomically engineered handle. I could see my reflection in the blade. "Here, you'll get that hole dug faster with this and it'll save your back."

I finished the hole and filled Herb's pump sprayer with soapy water, kicked open the telescoping covers and started spraying down through the frames.

Aurora walked into the yard. "I found Mildred again, or is this a different . . ." she stopped mid-sentence. "What are you doing?"

"My bees have foulbrood. I'm putting them all down and burning everything. Going to have to start over again."

Aurora gasped. "Isn't there anything you can do to save them?"

"Well, I could put them into new equipment and hope for the best, but that's too expensive. I'm going to start over."

"So," Aurora said, "You could save your bees, but it would cost money. Hundreds of lives lost because of greed."

"No, sadly, thousands of lives lost for lack of resources. And hundreds of dollars of equipment up in smoke."

Aurora turned and stalked off, still carrying Mildred. She never did speak to me again, although Lyle stopped by a week later while walking their Pomeranian and told me I was accumulating a lot of bad karma.

I lit a fire in the pit and started tossing in frames. Herb brought a lawn chair over and sat by the fire with a can of soda. He offered to mow my lawn. It was starting to look green.

Nancy and I decided to find a place a little farther out and started looking at properties. We found a house in a little hollow. The property extended beyond the horizon in all directions – no visible neighbors, just the gentle hum of a riding mower down the road to the right. The next nearest neighbors to the left lived up the hill and through a wood, a friendly granola couple, out of sight and out of mind.

We bought it, and happily grow dandelions and Dutch clover in the yard. I hardly ever have to mow, since Nancy bought me a tractor and brush hog for my birthday. BC

Peter avoids his neighbors somewhere near Bath, NY.

All The Buzzz in...

Hello Friends,

When you eat a slice of pumpkin pie, remember to thank a honey bee!

Bee B.Queen

Kate, RI

Thank you, God for the trees,
And for the bees they swarm in trees.
Giving us shade in the day,
It feels so good I say!

Johnny Shetler, 10, OH

Caroline, 7, FL

Bee B. Queen Challenge

I need a good laugh. Send a bee joke my way.

"Why didn't the skeleton dance at the party?"

He had no body to dance with.

Jolie, 6, PA

Morgan Dunbar, 11, OH

Exploring Exoskeletons

Queen Guinebee and Sir Dronesalot

We can stand, walk and move thanks to our bones, our skeleton. The honey bee, being an insect, does not have bones like us. In a sense, its skeleton is on the outside of its body. This rigid outer covering is called an exoskeleton.

The exoskeleton helps to protect and support the organs of the bee. It also provides a place for the muscles to attach to. It is a bit like a suit of armor.

The exoskeleton does not grow with the body. An insect will shed that outer layer as it grows. For a honey bee this only happens in the larval stage. The exoskeleton is covered in a thin layer of wax which helps to keep moisture in the bee's body so that it won't dry out.

The exoskeleton is made from something called chitin. Chitin provides strength and flexibility. Chitin is also found in the cell walls of certain fungi and algae. Chemically, it is a nitrogenous polysaccharide (a carbohydrate). Say that three times fast.

The word chitin is pronounced "kīt'n".

Like "kite in".

Magnified exoskeleton and setae (small hairs) of a honey bee

You can remember the word exoskeleton by knowing "exo-"means "outside". The bee's "skeleton" is on the outside of its body.

Photo Credit: CDC/Janice Carr/Connie Flowers/Pamela Munn/Used with permission from the International Bee Research Association, www.ibra.org.uk

... Bee kid's corner

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

Aidan Weigle, MD

Aidan made these bees for his birthday party. The "exoskeleton" is thick paper and the wings are made from netting. Don't forget the googly eyes!

"Who was the most famous skeleton detective?"

Sherlock Bones.

Matching Challenge

Use a dictionary to help match these very long words with their meaning.

___ Exoskeleton
___ Chitin
___ Invertebrates
___ Vertebrates
___ Arthropods
___ Setae
___ Shed (verb)

A. A tough, protective, substance that is the main component of the exoskeletons of arthropods

B. Having a backbone or spinal column. Humans are in this group.

C. A hard, protective outer body of an animal, such as an insect, crustacean, or mollusk that provides protection or support for that organism.

D. To cast off or let fall by a natural process.

E. Lacking a backbone or spinal column. Bees are in this group.

F. This group includes insects, the crustaceans, arachnids, and centipedes. They are invertebrates that have jointed limbs, a segmented body, and an exoskeleton made of chitin.

G. Small hairs found on a honey bee..

"What instrument do skeletons play?"

Trom-BONE.

Human Exoskeleton

Students and researchers from around the world are working on powered exoskeletons for humans. These metal or plastic skeletons are worn on the outside of the body and can help paralyzed people walk. Do an Internet search for "powered exoskeletons" to see this amazing science.

Bee Buddy

Madilyn Epple, age 7 from Virginia, drew 100 bees for a first grade math project. She is a Brownie Scout and likes taking pictures, running track, dancing, and spending time with her family. She occasionally helps her grandfather, Dale Norman, in his bee yard. She enjoys sharing everything she knows about bees with her friends.

Answers: C, A, E, B, F, G, D

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.

Master Beekeeping Programs, Part 3

Ann **Harman**

This is the last in the series of Master Beekeeper programs in the U.S. To refresh your memory these are the states that I could find with a program: NY, VA (new), WV, NC, SC, GA, FL, AL (new), OH (new), NE, MT (new), OR (new), WA and the one regional program of EAS. In this article the program of Great Britain will be described.

In the search for Master Beekeeper programs and information about them one thing is clear – in most cases I consider it difficult. But I am not a member of all the state associations so I have no association member to ask about programs. Except for the several developing programs, even getting answers to my questionnaire was a bit difficult.

I would like to add that by far the most useful website is that of the Eastern Apicultural Society (EAS). Information is quite complete, **concise** and well-arranged. I would recommend that the 13 states visit this website (**www.easternapiculture.org/master-beekeepers**) and perhaps refresh their websites.

To continue with requirements for achieving various levels here are the Public Service requirements. The lists for some of these were found on websites. Prospective Master Beekeepers would do well to carefully study the requirements in their state.

Public Service Credits

Most of the Master Beekeeper programs include Public Service Credits as a requirement. However, no state requires them for the initial (beginning) level. NY: none are mentioned. EAS has no Public Service requirements. It is hoped that the certified Master Beekeepers are providing education to beekeepers and the public in their home states.

A few states are still developing their programs so the following are what have been established so far. VA: the second level requires six credits. AL: the second level requires five and the third level requires 10. OH: the second level requires five units. MT and OR: both are under development.

The following states have identical requirements for Public Service with the second level at five credits, third level at 15 and fourth level at 20: NC, SC, GA, FL. However these states each have their own list of possible credits.

A few states have different requirements. WV: requires six at the second level and 12 for the third level chosen from a list of 14 topics. NE: just states that "service credits required." WA: has a point system. From a list of 14 topics with a number of points assigned to each one, the second level requires 30 points. The number of points for the third level is specified only in the Master Syllabus that must be acquired from a source other than the website.

Other Requirements

Some of the states have some interesting requirements. For the second level in WV you must receive two blue ribbons in two different classes at "an approved honey show." For the third level you must judge a honey show. For the fourth level in NC and SC you must give a presentation at a state meeting. For GA a presentation is to be given at the annual Beekeeping Institute and another at a state meeting. In FL for the third level you must declare a "major" and also obtain "core" credits outside that major. It is rather complicated. For the top or fourth level in NC, SC, GA, FL you must substantially participate in a university-sponsored research project.

In AL for the third level you must choose and show expertise in six of 19 "majors" (topics). In OH for the third level you must prepare a Power Point presentation for a state association meeting. In WA the top level requires four research papers and one presentation.

Who Composes the Exams and Who Grades Them?

This information was also taken from the questionnaire. No information for NY. In VA the tests have been developed by the apiculture professor at Virginia Tech and State University; graded by the Virginia State Apiarist. In WV only one member of the state association composes and grades the exams. In NC the Educational Directors of the local clubs compose and grade the first level exams. For the three upper levels the Master Beekeepers of the Master Beekeepers Program Committee of the state association compose and grade exams. SC: The apiculture professor at Clemson University composes and grades the exams. After his retirement two Master Beekeepers will do the composing and grading.

In GA; the apiculture professor of the University of Georgia composes the exams. His staff and Master Beekeepers grade the two lower levels. Another professor and the apiculture professor grade the Master exams. These two are joined by a Master Beekeeper and one guest honey bee scientist to judge the oral exam for Master Craftsman level. In AL a member of the Master Beekeeper Committee of the state association takes test questions from the instructor's class materials; tests graded by the committee member and the instructors. Since the OH program is being developed it is not clear who is composing and grading the exams. In NE the apiculture professor and his graduate students compose and grade the exams. In MT the faculty level instructors from the university compose and grade the exams.

In OR the exam sub-committee of three professors and 12 beekeepers compose and grade the exams. In WA the exams are composed by members of the committee and graded by only official certified instructors with the guidance of the apiculture professor. For EAS the Academic Advisor with help from the board level EAS Master Beekeeper committee composes and grades the written and lab parts. The oral exam, composed by EAS Master Beekeepers, is evaluated by a panel of three Master Beekeepers. The field exam is given and evaluated by Master Beekeepers.

Book Lists

Although the Master Beekeeper programs have suggested reading lists (FL – "strongly suggested") those lists must be one of the most neglected updates to the programs. Many contained out-of-date books although a few states did comment that some material, particularly those on mites and diseases, is dated. Book lists for several states (NC, AL, OH, NE, MT) could not be found. A few lists included out-of-print books that are not only difficult to find but are extremely expensive on the secondhand market. Generally beekeeping books are not commonly found in public libraries but a few may be found in beekeeper association libraries. All of the Master Beekeeper programs would benefit from a thorough review and updating of their book lists. For example, a 2005 book on honey bee law would be preferable to the 1981 book commonly listed. Excellent new books have appeared that could easily replace some of the older ones. In addition the lists should certainly follow some basic bibliography format; date of publication and edition should not be ignored.

Problems

In my questionnaire I asked what problems have arisen with the program. The answers varied with only SC reporting no problems. NY did not respond to the questionnaire. VA just reported that it was a slow start but the program is under development. WV saw little motivation and lack of participation. NC reported that the MB program was a massive undertaking for the local associations as well as the state association. GA is trying to solve the unhappiness with the Journeyman test that requires 100% or fail by changing their lecture series. FL reported that the beekeepers are not always familiar with the rules and requirements of the rather complicated program.

AL has to certify each instructor at appropriate levels so that applicants can progress through the levels. OH program is in progress. NE reported that not all who start actually finish. Also there is a limit of 60 participants each year. MT has a waiting list but the whole program is still under development. OR reported that not all beekeepers have access to the classroom training so online classes are planned. WA needs to make certain all teachers across the state are current with the program and keep updated. More helpers with experience are needed. EAS has an annual conference where Master Beekeepers involved with the program meet to discuss any problems and changes. BC

Ann Harman lives and keeps bees in Flint Hill, Virginia. Ann is also a long time EAS Master Beekeeper.

Beekeeping Examinations in the United Kingdom

Basically the UK program has two parts and is countrywide. Just one program. The Examination Board of the British Beekeepers Association (BBKA) gives written and practical exams with certificates given in a number of levels of expertise. The National Diploma in Beekeeping is governed by the National Diploma Board (NDB) and is designed for those who wish to go beyond the top certificate of the BBKA program.

Information on the two parts can be obtained from these websites: **www.bbka.org/learn/examinations assessments** and **www.national-diploma-bees.org.uk**

A candidate for the BBKA exams can obtain *Beekeeping Study Notes*, books appropriately designed for the individual levels. These books are detailed texts on all aspects of beekeeping. These Study Notes, updated when necessary, are impressive and exceedingly useful.

The progressive levels of certificates are: Basic Assessment, General Husbandry, and Advanced Husbandry, all considered practical beekeeping. After passing the Basic Certificate you may then take the written examinations for the single-topic modules. These exams can be made in two steps: the Intermediate Theory Certificate followed by the Advanced Theory Certificate. In addition you can take one or both specialized certificates: Microscopy and Show Judge.

If you hold the Advanced Certificate in Beekeeping Husbandry and Advanced Theory Certificate you are considered a Master Beekeeper. At this point, if you wish, you can study for the National Diploma in Beekeeping.

A number of Short Courses and a week-long Advanced Course are given to help candidates prepare for the NDB exams. Those who pass have achieved the highest level in beekeeping in the UK. Those who have obtained the National Diploma are far more advanced in their knowledge than any Master Beekeeper in the United States.

In closing, would a unified program such as in UK be possible in the United States? After reviewing all the information gathered from the 13 states and one regional association, I think not. Although some similarities exist among the 14 programs in the U.S., too many differences are readily apparent. Other states in the U.S. will create Master Beekeeper programs that, again, cannot be compared easily with the ones in existence.

We do need to commend and congratulate those who are participating in the Master Beekeeper programs available. They are capable and knowledgeable beekeepers whom, we hope, will educate others and advance beekeeping here in America.

Tattoo Culture

Inked Bees

Jessica **Lawrence**

Got an inked bee, and a story to go with it? Let's take a look.

When my mother first realized I had a tattoo, calling her reaction "unhappy" would be an understatement. When she realized I had more than one, she was convinced that I had turned to "the dark side" and she was right, as mothers usually are. I am currently sporting 12 tattoos, but that doesn't mean that number will even be correct by the time this article is published.

In a world where everyone can be fleetingly famous, thanks to the internet and smart phones, more people are looking to individualize themselves and express their interests and passions in a more permanent manner than their ever-changing Facebook status. A few even find mainstream celebrity status, thanks to TV shows like "LA Ink". Now that one of every four people have a tattoo (based on my completely biased perspective of my 25-35 age range of friends, plus family and coworkers), the older generations are starting to look at us less like we may steal their personal belongings, and some are even joining us in our tattoo revolution.

How do you pick a tattoo? People change as they age, and you don't want to look at a permanent reminder of your embarrassing obsession with seahorses when you were 18. However, you have to be a fluid personality to purposely change yourself permanently and be okay with it. You will need to be able to accept that in 20 years, you may not have the same taste, and look at it as a reminder of where you were in your life to decide on that design. I personally see my tattoos as a road map of my adult life, and any tattoo that is not one of my favorites is due to the quality of the art, not the content.

As most of my life is focused around insects, they are the choice target for my renderings. Almost two years ago I began collecting honey bee tattoos. They are the driving force behind my career, my photography, my cooking and really most of my spare time in some form or fashion. Each one tells a story of where I was at the point in time that I decided on the design.

I was attending my first NABC meeting in Galveston, Texas. I didn't really know any of the beekeepers on such a large scale, and I had only been working professionally with bees for a year. This was my first season that started with planning for the bees first above all other insects. I was always enamored of the Queen (I think everyone is), and I thought it would be funny to have a tattoo of one where I could ALWAYS find her. So, to commemorate my first NABC, I went to a nearby tattoo parlor and picked up a queen bee on my wrist. She is not anatomically perfect, but you always love your first...and someday I may take the time to make her "prettier".

Again attending a bee conference, this was my first EAS meeting in Warwick, Rhode Island. The crowd was open and friendly, but I was mostly excited because I won blue ribbons for my photography. A photograph

that I didn't enter (and I wish I had!) was an 8X10 of a queen with eggs beneath her. Since it was still in my possession, my EAS tattoo was an artist's rendition of this photograph. As it stands now, it is my second favorite tattoo (only second to my very first tattoo).

My first California project landed me in an alfalfa field working with the bees in the San Joaquin Valley. This was really my first extensive trip into the area, and I have to say that it wasn't what I was expecting. I always had a vision in my head of majestic redwoods and sequoias making one big forest, straight out to the sandy beaches where cool California surfers rode the iced waves of the Pacific. In my fantasy geography, Los Angeles and San Francisco were the only cities in the state (the airport and growing up watching "Full House") so I was surprised to be landing in Fresno. I will say that Fresno's airport is now my favorite but for their lack of Pepsi for sale, and my love of Ansel Adams drew an instant connection to Yosemite. During this trip, my tattoo came from the Tower District and is the outline of the state of California with a bee flying over the valley.

By this time, I am a master traveler to the state of California. My journey took me to my first real interaction with almond blossoms, and my longest period of time away from home. I spent 24 nights in the valley working in the almonds with my bees, talking to major beekeepers, and I even had a chance to meet Kim Flottum and Kodua Galieti for lunch with my work crew. I have a picture from the event of me showing off my tattoos in the Blossom Trail Café to anyone who would look. This meeting is the conception of the idea of this article if I remember correctly, as well as the birth of my next tattoo idea. For the second time in the history of my tattoos, I went back to the same tattoo shop as my last bee. I was a little startled when I realized the artist did not know what an almond branch looked like (living in Fresno, this seems strange to me still), so when I went back to the shop I took a whole branch with me. I also made him give my bee a pollen basket. If I'm going to have a worker bee, she had better be working!

What's next in line? Perhaps an old-school vintage drawing of a worker, queen and drone? Or, a worker bee anatomy with all the pieces labeled? Someone recently suggested that I needed a tribute to North Carolina among my California memorabilia, so maybe that could be an option too.

Do you have a story to go with a honey bee tattoo? If so, send me a high-quality photo and a back story of what your tattoo means to you and your history with bees. You may see it in Bee Tattoo Part Two! Send photos of your tattoos to *Bee Culture* – **Kim@BeeCulture.com** or to Jessica at **Jessica@checkmateapiaries.net**. BC

Jessica Lawrence is a Research Entomologist for Eurofins Scientific, an avid gardener, beekeeper and tattoo collector.

GLEANINGS

OCTOBER 2012 • ALL THE NEWS THAT FITS

AUSSIE BEES DOOMED

Australian bees are not tough enough to resist *Varroa* mites and imports of stronger stock are needed to avoid an economic disaster when the mite finally reaches the country.

New research finds Australian honey bees are highly susceptible to the *Varroa destructor* mite, a pest that hasn't yet reached its shores but will potentially devastate them when it does.

All the experts agree a *Varroa* invasion is inevitable.

A research project carried out by the University of Sydney and the U.S. Department of Agriculture's Agricultural Research Service recommends urgent steps be taken to implement a quarantine process to permit safe importations of *Varroa*-resistant stocks before the mite arrives in Australia

The researchers evaluated seven lines of Australian bees and found none had any resistance to the *Varroa* mite.

"In comparisons of the seven Australian lines only non-significant and trivial differences were found for infestation and mortality rates," the report says.

"Prior to this project we had no information about levels of resistance to Varroa in Australian bees, and therefore did not understand whether we had a significant problem."

The research project compared the responses of the Australian honeybees to a *Varroa* infestation with the responses of U.S. Italian honey bees that are known to be susceptible to the mite and two other types of honeybee known for their resistance to *Varroa*.

After only four months of exposure to the *Varroa* mite, 44% of all the Australian honey bee lines had died. This compared to a 4% mortality rate over the same period for the most resistant Russian honey bee, which isn't found in Australia.

Prof. Ben Oldroyd of the University of Sydney says the research provides a clearer picture on the potential impacts of a *Varroa* incursion in Australia.

"It is largely accepted that *Varroa* will eventually reach Australia and the findings from our research give us an indication of just how severe an impact this pest will have on our honey bee populations," Oldroyd says.

Because Australian honey bees have never been exposed to *Varroa* the chances of them being susceptible are much greater, he says.

"If there was a positive to take out of this research it is that it showed there are breeds of bees that do have a considerable resistance to *Varroa*, however these bees aren't currently found in Australia," Oldroyd says.

"If the Australian honeybee industry and honey bee dependent crops are to have any chance of minimizing the impact of *Varroa* when it arrives then it is critical that *Varroa*-resistant honey bees are bred for the Australian environment, and urgently." – *Alan Harman*

OBITUARY

Dave Emde passed away June 30, 2012 in Orlando Florida. He was 76 years old. He is survived by his daughter, Lindi Neal and his son Dave Emde Jr., both living in Florida. He had two sisters, Gail MacLafferty (TN) and Jeanne Townsend (FL) and two brothers, Mark Emde (TN) and Tom Emde (FL).

Dave had a big heart and was always willing to help those around him. He was fun-loving and enjoyed people. He will be greatly missed by friends and family.

Dave owned and operated Western States Apiaries from the 1950s through the 1990s, doing business in Timber Lake, SD and Winter Garden, FL. In later years, he also operated a bee business in Big River, Sask, Canada and a queen operation in Apopka, FL, both of which were founded by his father, Earl Emde.

Migratory beekeeping was Dave's first love. When it came to moving bees, he was an innovator. In 1966, Dave met Woody Woodworth in Dickinson, North Dakota. Woody had a Melroe Bobcat loader and he and Dave started thinking about it's possible use for moving bees. This included plans for a pallet that would hold four colonies using metal U-shaped clips and a plywood floor. These features eliminated the use of bottom boards and made it quick and easy to take colonies off and on the pallet. Incidentally, Dave and Woody both received an award at the 1992 San Diego American Beekeeping Federation convention for this contribution to migratory beekeeping.

In the Fall of 1966 Dave and his brother, Tom drove to Gwinner, ND (where Bobcats were manufactured). Their first loader was the Melroe Bobcat 500. The price was $4300.00, which included the Bobcat, attachments, and a trailer.

During 1967 Emdes palletized their 4,200 colonies. Their brother, Mark soon bought his first Bobcat with the same goal in mind.

In January, 1968, Dave took an 8 mm movie to the ABF convention in Niagara Falls, NY, where it received much interest. The film showed the use of the Bobcat and the four-colony pallet for moving bees. Jim Powers was in attendance and very interested in this new method of handling colonies. In June of that year, Jim sent one of his managers to Timber Lake, SD to pick up one of the Emde pallets. He then had the pallet cut in half, sending each piece to two of his operations. The rest is history; migratory beekeeping was changed forever. Even though the skid-steer loader was not the first machine used to load and move bees, it was the first one that changed migratory beekeeping nation-wide.

The use of the Bobcat, the opening a many new Interstate Highways in the 1960s, and using larger trucks were the perfect combination for beekeeping. Having hives on pallets meant bees would travel cooler with more air movement. Better highways allowed trucks to move through cities quickly. This all combined to make life much easier for beekeepers.

Thank you, Dave, Woody, and Jim Emde.

Migratory Pioneer, Dave Emde.

OBITUARY

File Photo.

Joseph O. Moffett, 86, died on Tuesday, July 17, 2012 in Stillwater, Okla. He was born on January 9, 1926 to Joseph Orr Moffett, Jr. and Myrtle Ester (Mathoit) Moffett in Peabody, Kan., He married Lucy Arlene Hodges on November 13, 1944 in Reidsville, NC. They had seven children and were married for 64 years until her death in 2007. He was a Sergeant in the U.S. Army during World War II.

He received his B.S. and M.S. degrees in entomology from KS State University and his PhD from the University of WY in Laramie. He did research at CO State University for nine years starting in 1949 and helped find a cure for European Foulbrood.

Starting in 1959, he was secretary-treasure of the American Beekeeping Federation for five years.

He did research at the USDA Bee Culture Disease Laboratory in Laramie, WY and the Carl Hayden Bee Research Center in Tucson, AZ from 1967 to 1978. His research included studies of citrus pollination and herbicide toxicity. While still working for the USDA, he studied alfalfa pollination in Stillwater, OK and taught at OK State University there. In 1986 he moved to Weslaco, TX. At the bee laboratory there, he researched bee mites and studied Africanized Bees in Mexico. He retired from the USDA in July, 1988. He remained in Stillwater and started several small businesses there.

He is preceded in death by his parents, Joseph and Myrtle Moffett; wife, Lucy Arlene Moffett; daughter, Linda Sue Glazebrook; son Jimmy Don Moffett; and sister, Dorothy Harp.

He is survived by his sons, David Joe Moffett, Wichita, KS.; Terry Ray Moffett, Chattanooga, TN; Steve Jay Moffett, TX; daughters, Nancy Lou Elliott, Ripley, OK; Kathy Lee Howell, Tucson, AZ; brother, Robert Moffett, Peabody, KS; and nine grandchildren, 25 great grandchildren.

CHINESE HONEY BANNED AGAIN

Beekeepers in Burma wants imports of Chinese honey banned, saying the cheap product threatens to put local beekeepers out of business.

A spokesman for the Myanmar Apiculture Association – the Southeast Asian country was unilaterally renamed Myanmar by the military dictatorship – says its members are concerned because Chinese honey, banned by the U.S. and the European Union over the presence of antibiotics and chemicals, is being imported by some businesspeople.

Myanmar Livestock Federation vice chairman U Win Sein tells the Myanmar Times that the country's honey has an excellent international reputation because of its quality and purity.

"Some businesses want to import Chinese honey, even though it's banned by Europe and the United States because some samples have been found to contain antibiotics or harmful chemicals," he sys.

The apiculture association sent a report on the problem to the Myanmar Livestock Federation requesting a halt to any imports.

Association chairman U Pyae Phyo Aung says the industry needs government protection.

"We need to protect our market here in the face of businesspeople who are trying to make easy profits," he says. "Beekeeping is already a challenging business and many in the industry make small profits, which Chinese imports can possibly destroy."

The association has 365 producers with almost 60,000 hives and Myanmar exported 2,132 tonnes of honey in the 2011-12 financial year, earning US$2.13 million.

HONIBE® HONEY DROP® CHOSEN AS A 'SNACK FOR SPACE' BY THE CANADIAN SPACE AGENCY

Island Abbey Foods Ltd., a PEI based natural health product and specialty food producer, has announced that their Honibe® Honey Drop® is going up to the International Space Station (ISS) as part of the official Canadian Space Agency (CSA) Snacks For Space competition which identifies Canadian snack solutions for use in space! The Honey Drop®, only one of a select few chosen from over 150 submissions, will be going into space as a novel food innovation and will provide the International Space Station crew with an alternative to the liquid honey currently used during their missions.

The Honibe® Honey Drop® is an individual serving (one teaspoon/ 5g) of 100% pure dried honey without any additives. It is ideal for sweetening tea or coffee or can be consumed as a natural energy source. The Honibe® Honey Drop® is noted as a healthier alternative to the sugar cube and is available in 20 or 12 count packages and in both pure honey and honey with lemon flavors. They are conveniently sized for easy transport in pockets, back packs, cars, briefcases, purses, and now – for space travel!

"After winning the top food prize on the planet in 2010, we are extremely excited about the Honibe® Honey Drop® tackling this next frontier… in space!" stated John Rowe, President of Island Abbey Foods Ltd. "We will be sending our Honibe® Honey Drop® up to the ISS this fall. Our Honey Drop® is a perfect alternative to liquid honey and the team will be able to enjoy this sweet and nutritious food without all the sticky mess. We believe the ISS team will think our Honey Drops® are truly out of this world!"

For more information please visit us on the web at **www.honibe.com** or **www.islandabbeyfoods.com**.

EU, CANADA, BEES AND PESTICIDES

The European Food Safety Authority (EFSA) has published a state-of-the-art scientific review of the risks posed by pesticides to honey bees, bumble bees and solitary bees. This major piece of work will support the development of specific guidance for the assessment of possible risks to bees from the use of plant protection products. The guidance will provide up-to-date advice to those involved in the evaluation of plant protection products and their active substances, including industry and public authorities.

The opinion published this Spring on the science that will underpin the guidance was requested by the European Commission and responds to growing concerns among MEPs and beekeeper associations about the appropriateness of the current risk assessment scheme. It is also part of EFSA's coordinated response to the decline in the numbers of honeybees, wild bees and other pollinators in Europe.

EFSA's Panel on Plant Protection Products and their Residues (PPR) started from the premise that to develop robust environmental risk assessment procedures, it is crucial to know what to protect, where and over what period. The Panel noted that bees play a valuable role as pollinators, contribute to biodiversity and provide hive products such as honey and royal jelly (for honey bees). The scientific experts then looked in detail at four key areas, as suggested by the European Commission:

- the acute and chronic effects of pesticides on bees, particularly colony survival and development
- how to estimate the long-term effects of exposure to low concentrations
- the need to take into account the cumulative and combined effects of different pesticides
- existing test protocols and possible new protocols that take account of the exposure of bees to pesticides through nectar and pollen.

The document proposes two separate assessment schemes: one for honey bees, and one for bumble bees and solitary bees. In the initial stage it is suggested to include toxicity testing that covers an exposure period of seven to ten days for adult bees and larvae. Both life stages can involve exposure of longer than one day, a risk that is not covered by standard tests.

EFSA's pesticides experts also recommend improvements to existing laboratory, semi-field (cages, tunnels and tents) and field testing procedures. Several exposure routes (intermittent and prolonged exposure of adult bees, exposure through inhalation and the exposure of larvae) are not currently evaluated in laboratory tests, and the effects of "sub-lethal" doses of pesticides are not covered fully.

In field and semi-field testing, the experts identify several weaknesses that lead to uncertainties in the actual exposure of honeybees. They highlight the need to improve the methods for detecting bee mortality, the observation of sub-lethal effects and the statistical analysis of test results.

The use of pesticides is cited widely as one of the possible contributing factors to the decline in bee numbers in some parts of the world – along with other factors such as disease, parasites, climate change and other environmental factors, and the effects of genetically modified organisms. This decline is causing concern because bees, particularly honey bees, play an important role in the pollination of a wide range of crops and wild plants. It is estimated that the production of about 80% of the 264 crop species cultivated in the European Union depends directly on insect pollinators, mostly bees, and the global annual monetary value of pollination is estimated to be in the range of billions of dollars.

Given the importance of bees in the ecosystem and the food chain and given the multiple services they provide to humans, their protection is essential. EFSA has an important role to play in ensuring the survival of bees given the Authority's mandate to improve EU food safety, safeguard animal health and welfare and ensure a high level of consumer protection.

EFSA's scientific experts are currently developing a dedicated and co-ordinated work programme related to bees in the areas of pesticides, animal and plant health, and genetically modified organisms. The Authority is also carrying out a gap analysis for risk assessment and data collection and will identify areas for further research. EFSA's pesticide experts are also preparing a statement on two articles published recently in the journal Science which suggest links between neonicotinoids and bee colony survival.

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After examining more than 32 million European records of pollinators and plants, European researchers say bee diversity on the continent is declining and agrochemicals are a key reason.

Scientists involved in Status and Trends of European Pollinators (STEP), a large-scale project funded by the European Union, gave their findings at a STEP symposium during the 5th EurBee meeting in Halle, Germany

"We have shown that not only has bee diversity been declining but communities are becoming more uniform in their composition," says lead scientist Dr. Koos Beismeijer of the Netherlands Center for Biodiversity.

One key threat to bees is agrochemicals.

"We now are finding strong negative effects of pesticides, not only in honey bees and bumblebees, but also solitary bees," says Dr. Christoph Sandrock of the Swiss Bee Research Centre.

"As Europe has more than 2,500 solitary bee species we expect the implications of our research to be very wide ranging," he says.

The STEP researchers say pollinating insects contribute to agricultural production in 150 European crops, 84% of the total. These crops depend partly or entirely upon insects for their pollination and yield. The value of insect pollinators is estimated to be €22 billion (US$27.76 billion) a year.

"There is increasing evidence that honey bee numbers are insufficient in many parts of Europe to provide adequate pollination services, and so wild pollinators are needed to cover the shortfall," says Dr. Tom Breeze from the University of Reading in the UK.

Declines in managed pollinators, such as honey bees, and wild pollinators such bumblebees, solitary bees and hoverflies, are therefore of growing concern as we need to protect food production and the maintain wildflower diversity.

"To help Europe secure sustainable food production and conserve its biodiversity we need to provide policy makers with clear evidence of who pollinates our crops and flowers and what are the best options to safeguard pollination services in a changing world," says STEP coordinator Prof Simon Potts of the University of Reading.

Many European countries have an array of agri-environment options aiming to support biodiversity, including bees, but it is unclear how effective these really are.

"Our analysis is the first to systematically test whether agri-environment options are actually benefiting bees," says Dr. David Kleijn from Alterra, Netherlands.

Several European countries have programs aiming to improve honeybee health, but there is very little support for wild pollinators despite their critical roles in ecosystems.

"One of the big achievements of the STEP project will be the first ever European Red List for bees which will provide an essential tool for politicians and land managers to direct conservation efforts targeted at wild bees," says Stuart Roberts of the University of Reading.

The STEP project will continue to use high quality research to deliver the evidence politicians need to develop better policies to protect all of Europe's pollinators. The project also uses its findings to develop specialist factsheets targeted at groups such as farmers and translated in 15 languages.

Simultaneously, STEP is undertaking a broad-scale survey of the public opinion through online questionnaires available in seven European languages. The survey aims to reveal if, and to what extent, people are aware of the role of pollinators in agricultural ecosystems and the consequences for the environment from the decline of bees and other insect pollinators.

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AND CANADA, TOO – Health Canada's Pest Management Regulatory Agency (PMRA) orders a re-evaluation of the nitro-guanidine neonicotinoid insecticides, clothian-

idin and thiamethoxam, and their associated products registered in Canada.

Another nitro-guanidine neonicotinoid insecticide, imidacloprid, was already under re-evaluation.

PMRA says the re-evaluation of this cluster of active ingredients will focus on resolving issues related to environmental risk – in particular, the potential for effects of nitro-guanidine neonicotinoids on pollinators in light of changes in the information required and global updates to the pollinator risk assessment framework.

"This re-evaluation will consider all agricultural uses of nitro-guanidine neonicotinoid insecticides including soil applications, seed treatment, as well as foliar and greenhouse uses," PMRA says.

It says with continued emerging science on neonicotinoids and their potential effects on pollinators, the PMRA is collaborating with international regulatory partners to discuss further data requirements and in the development of enhanced risk assessment methodologies and risk mitigation measures for pollinators.

The PMRA has requested additional data on neonicotinoid insecticides and is working with international partners to develop additional data requirements and risk assessment methods.

It says the scientific community continues to publish additional research results and all new information must be evaluated to confirm that these products do not pose an unacceptable risk.

"To facilitate the evaluation of these chemically similar products, all nitro-guanidine neonicotinoids are being placed under re-evaluation to ensure a comprehensive environmental evaluation, including consideration of new scientific evidence emerging from the research community and to reflect the new methodologies being developed at the international level," PMRA says.

The agency has received reports relating to bee mortalities occurring in Canada and internationally.

"Should evidence become available demonstrating reasonable grounds to believe that health or environmental risks of a pesticide are unacceptable, the PMRA will take appropriate regulatory action," it says.

The agency is collaborating with international regulatory partners to fully evaluate the potential risk to pollinators from neonicotinoid pesticides.

"The PMRA is committed to only registering pest control products that meet stringent health and environmental standards and do not pose unacceptable risks," it says.

Neonicitinoids are highly toxic to a range of insects, including honey bees and other pollinators. They are taken up by a plant's vascular system and expressed through pollen, nectar and gutation droplets.

Pollinators are also exposed through dust released when coated seeds are planted.

In the U.S., an alliance of commercial beekeepers and environmental organizations filed an emergency petition in March with the Environmental Protection Agency (EPA) seeking to suspend all registrations for pesticides containing clothianidin.

The petition was signed by more than million people and asserts the EPA failed to follow its own regulations when it granted a conditional, or temporary, registration to clothianidin in 2003 without a required field study establishing that the pesticide would have no unreasonable adverse effects on pollinators.

Alan Harman

FOUNDATION OFFERING FIVE GRADUATE STUDENT SCHOLARSHIPS

The Foundation for the Preservation of Honey Bees is again offering scholarships of $2,000 each to five graduate students in apiculture. This is the Foundation's eighth year to award such scholarships.

The Foundation is a charitable research and education foundation affiliated with the American Beekeeping Federation (ABF). The Foundation has benefited from a generous gift from the Glenn and Gertrude Overturf estate, and is sustained by ongoing gifts from ABF members and other supportive individuals.

The Foundation Trustees have chosen to use a portion of the grant to offer graduate student scholarships to foster professional development for young apicultural scientists. The purpose of the scholarships is to allow the recipients to attend the American Beekeeping Research Conference during the 2013 North American Beekeeping Conference in Hershey, PA, January 8-12. The recipients will have an opportunity to meet other researchers and beekeepers and to present their research at the meeting. The Board of Trustees looks forward to their contributions to the conference. The scholarships are available to all graduate students. Graduate students at universities outside the U.S. are invited to apply.

Applications for the scholarships will be accepted until October 30, 2012. Recipients will be selected in November.

Applications must be submitted electronically to: Troy Fore, Executive Director; Foundation for the Preservation of Honey Bees; e-mail: **troyfore@honeybeepreservation.org**.

If you have questions or need more information about the scholarship program, contact: Marla Spivak, Scholarship Program Coordinator, Foundation for the Preservation of Honey Bees, **spiva001@umn.edu**.

MANUKA HONEY FRAUD

Fake "active" manuka honey is being sold in large quantities overseas, New Zealand's Unique Manuka Factor Honey Association says.

General Manager John Rawcliffe says samples from 33 "manuka" honeys on sale in Singapore were recently tested and 15 of them were not true to label. He tells Fairfax NZ News some had none of the activity claimed, while some had less than the label stated.

Rawcliffe says it appears certain that hundreds of thousands of jars of dubious "active" manuka honey are sold internationally.

But he says the association does not plan to try to be a global policeman because it lacks the power and resources to stop the multi-million-dollar honey labeling fraud involving many different types of honey.

The association wants to see government agencies enforce labeling laws and regulations.

Rawcliffe says honey that is supposed to come from New Zealand is on sale in Singapore with either no address for the New Zealand supplier or a fake address.

In Chile, some honey producers are marketing their honey internationally as though they possess the health and healing properties of manuka honey.

On another front, New Zealand's manuka honey industry is about to face new competition. The native manuka trees now are being grown in the United Kingdom, Australia and North America with the aim of cashing in on the high prices received for "active" manuka honey in the global nutraceutical market.

Alan Harman

HIVELIGHTS, a quarterly publication, published by The Canadian Honey Council. Subscription $50/year, post free. Send to Suite P.O. Box 914, Station T, Calgary, AB T2H 2H4, Canada.

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BEEKEEPING published by Devon Beekeepers' Association, SW England since 1935. 10 issues per year. Subscriptions outside Europe £28. Contact Alison Howes, 4 Deer Park Crescent, Tavistock UK PL 19 9HQ **alisonhowes@hotmail.com**, **www.devonbeekeepers.org.uk**. Apimondia Gold Medal site..

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BIRØKTERAN, Norges Birøkterlag, Bergerveien 15, N-1396 Billingstad, NORWAY.

TEKNIK ARICILIK – Türkiye Kalkmma Vakfi, Çetin Emeç Bulvari 8. Cad. No: 14/11, Öveçler 06460 ANKARA.

VIDA APÍCOLA, Montague Editores, C/ Ausiás March, 25, 1°, 08010 Barcelona.

ULUDAG BEE JOURNAL - Uludag Beekeeping Association, published quarterly in Turkish (with English titles and summaries of all articles) and English in all aspects of beekeeping; news, practical beekeeping, research articles. A link between Turkish beekeeping and the world. Gazcular Cad. No. 9/2 16220 Bursa-TURKEY. Tel & Fax: +90 224 224 3964, **http://www.uludagaricilik.org**.

HONEY BEE NEWS. The Journal of the New South Wales Apiarists' Association Inc. Published b-monthly. Internationsl Subscription (Airmail) AUS$50. Visa, MasterCard welcome. Contact The Editor, P.O. Box 352, Leichhardt NSW 2040 Australia, **honeybee@accesoft.com.au**.

THE AMERICAN BEEKEEPING FEDERATION has many benefits to offer its members. Send for a membership packet of information today! We also offer a free Beginning Beekeeping Packet. Contact the American Beekeeping Federation, 3525 Piedmont Road, NE, Bldg. 5, Suite 300, Atlanta, GA 30305-1509, 404.760.2875, FAX 404.240.0998 or email **info@abfnet.org**.

INNER ... Cont. From Page 15

So what do you think?

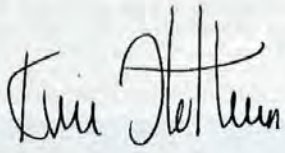
And while we're at it, what do you think about labeling food containing GM ingredients, by the way?

Any bets that real soon, everything will have a label that says... May have been made in a factory that has milk, peanuts, seafood, gluten, and possibly GM foods. All bases covered. Take your chances.

It's October. Time to slow down unless you're going to California. If that's the case read Project Apism's BMPs on getting ready and getting across the border. It'll be worth your time.

P. S.

Some exciting things going on here at *Bee Culture* you should be aware of. We're starting four new areas in January, City Bees, with Toni Burnam, who actually has her first piece this month. Southern Beekeeping with Jeff Harris, until recently with the USDA Bee Lab in Baton Rouge, but now in Mississippi (hanging out in Clarence Collison's old haunts) as the State Extension Specialist in Beekeeping. He's a real asset to have around. Then there's Phil Craft, retired State Apiary Inspector from Kentucky, who spent a career answering questions...and will continue that role here, Asking Dr. Phil. And don't miss Jessica Lawrence, a Honey Bee Researcher, Gardener Extreme, beekeeper (and tattoo fashionista) who's looking Outside The Box each month. Stay tuned...bigger and better than ever!



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I like my Summer job on top of Aspen Mountain. It's only two days a week. They call me a "ranger," but all I really do is hand out a few band-aids, and help as needed. Ninety percent of my duties consist of being friendly and helpful to the gondola riders. They come up to listen to music, have lunch, play disc golf, bounce on the "Eurobungy" trampoline, take a hike.

The setting couldn't be more dramatic. You're ringed by the Elk Mountains and 14,000-foot peaks. Maybe where you live the world is mainly horizontal. Here, it's vertical. Take a wrong step, and you could tumble down the hill.

We do get a crowd. Celebrities rub elbows with commoners. You could run into Jimmy Carter or Vince Gill or even those Koch brothers.

On Saturdays I give my honey bee talk. One morning I talked about Colony Collapse Disorder. I had seven attendees. The Peruvian dentist from Montreal, his Canadian wife and three teenage sons – plus an Aspen Center for Environmental Studies mountain nature guide, and a pizza delivery guy from town.

The nature guide and the dentist's wife were the best listeners. They had the most thoughtful questions. The woman seemed to be in a sort of honey bee reverie. She hung on my every word. The three teenage boys, if not fascinated, were at least polite, which with teenagers is saying something.

The pizza delivery guy (not his real occupation!) is well known around town. He might be 50. My gal Marilyn knows him. He believes in raw food, extreme skiing and too much exercise. He has a ponytail and a gentle, almost tender countenance. Maybe he's spent time in India, or Marrakesh. He thinks he knows about bees.

So I'd mention say, pollen, and Ponytail would shout out, "It's the world's most perfect food. I eat it for breakfast every morning!"

When I would correct him on one of his wild assertions, he'd smile sheepishly. He has a certain charm.

The dentist for some reason blurted out that he was at my talk only because his wife insisted. I complimented him on his good judgment. "You're a wise man to be here," I said. (You don't want to wreck your vacation by not being a good sport.)

But he was a big interrupter, too. Imagine someone who knows literally nothing about bees, but who, instead of listening and picking up what he can, questions everything. Once, while I was talking about pesticides as a possible contributor to CCD, he interjected, "Those bees, why do they fly around so much? They don't know where they're going!" Conjure this dramatic outburst in the thickest Latin accent!

My talk began at 11:30, and at noon the dentist's wife announced that, regrettably, they had to depart for a nature walk and then get the kids on the climbing wall before the rain came. Just when I was getting to the best part of my presentation!

You take what you get in the bee talk business. At least folks are interested.

I drive the truck up the mountain in the morning, so it harms no one if I leave early and on the way up check my 10 hives on the Strawpile ski run, at 9,000 feet.

I'm not the only one who checks them. The other evening on my way down the hill, I spotted a smallish bear on the road. He was mostly black, with a brownish ruff down his back, like a grizzly. He didn't seem alarmed as I approached. He can smell the honey. He was on his way to check to see if my solar electric fence was popping. I know he was. Bears are smart.

Now, in mid-August, there's been a little honey flow for a few weeks. Before that I was feeding bees. I wonder where they find nectar, because this crazy, first-dry, then wet Summer I can scarcely find a flower on the ski hill.

I like to think I have my bees figured out, at least on some level, like where they find food. But I realize I don't. The other day it dawned on me that the little darlings probably *aren't* making honey on the ski area. The ski area is just the home they return to after foraging where they will.

Picture this place as straight up and down. My apiary is 1,000 feet above town, which lies at the base of the mountain. They could be flying straight over town to the Hunter Creek Valley. It's not so far. I can only guess what wildflowers grow there.

We know so little about our darling honey bees. Maybe it's better that way. I dream of them beelining toward mysterious fragrances, toward hidden treasure troves of late-blooming wildflowers, somewhere.

Ed **Colby**

Little Darlings On Top Of Aspen Mountain

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