Aug 2012

Catch The Buzz™

Bee Culture

The Magazine Of American Beekeeping

www.BeeCulture.com

Planning A Beekeeping Business - 29

Telling Wasps & Bees Apart - 37

ROOT PUBLICATIONS

$4.99

08

7 35048 28163 9

Up close and personal. (Photo by David Sands.)

Executive Publisher – John Root
Associate Publisher, Senior Editor – Kim Flottum,
Kim@BeeCulture.com, 800.289.7668, Ext. 3214
Assistant Editor, Design Coordinator – Kathy Summers,
Kathy@BeeCulture.com, 800.289.7668, Ext. 3215
Circulation, Advertising – Dawn Feagan,
Dawn@BeeCulture.com, 800.289.7668, Ext. 3220
Publications Assistant – Amanda DeSimone,
Ashaffer@RootCandles.com, 800.289.7668, Ext. 3255
www.BeeCulture.com, Blog.BeeCulture.com

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

Subscription Information
U.S., one year, $25; two years, $48. Newsstand price: $4.99. All other countries, (U.S. Currency only), $15.00 per year additional for postage. Digital Edition $15. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), August, 2012, Volume 140, Issue 8, 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
Contact Dawn Feagan
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

FEATURES . . .

DEPARTMENTS & COLUMNS

GLEANINGS-73, CALENDAR-76, CLASSIFIED ADS-77

Blog.BeeCulture.com

www.BeeCulture.com

www.BeeCulture.com/Buzz

Contributor to Mother Earth News

Swarm Bucket

I would like to make a comment on the swarm bucket written by David Middleton. I made that system of joining two buckets like David's article explains with one difference. I have three lids one has not been modified, the other two have screens installed in them. When I go after a swarm, I will capture the majority of the bees, then I put the solid lid on the bucket with the bees in. Then I will set the bucket on its side and wait till the rest of the bees ball up on the screen inside of bucket. When I get ready to bring the bees to a hive, I will give the bucket a little tap take off the solid lid and snap on the other screened lid. That way the bees will get ventilation if you have to travel from swarm site to hive site. The first time I used it, I had to travel 45-60 minutes each way. The bucket system works great and thanks for sharing your idea Mr. Middleton.

Shane Brozovich
Utah

I was reading through my July 2012 *Bee Culture* magazine and noticed a comment on Swarm Buckets by Tom Goebel of NY. I was very interested in the buckets and could not remember reading this article. So I went through all of my *Bee Culture* magazines since 2005 and believe it or not that is the one issue I never received. No wonder the article did not ring a bell with me.:) What I am wondering is how can I get this issue?

I love your magazine and it has truly helped me in my beekeeping adventures. I love the sections where you build things. Covers, boxes etc. I also love the recipes and things you can make out of your wax. I make the lip balm from one of the recipes in a 2008 issue.

Thank you so much.

Candy Boise

Editor's Note: *A copy is already sent.*

Three Ladies

I want to thank you for your article, 3 Ladies, in the June issue of your magazine.

This article really hits home with me. I am a handicapped woman beekeeper, trying to make my way in the deserts of New Mexico with my bees. I have met other women in the beekeeping world, but, usually they just help their husbands in their business. It is really inspiring to read about women who went about it on their own, in tough conditions.

It has been very rough for me, especially in an area that is very tough for bees to survive in, but I truly love my girls. I have been working with bees since I was a child, (my grandfather kept bees) and I would never imagine myself doing anything different. Bees are a wonderful, irreplaceable part of our environment, and I could never imagine going out to work in my garden without watching some of my bees work the plants along side of me.

It was wonderful to read about other women who seemed to love and respect their bees for how the bees could provide for them as well. Its also good reminder that we can all succeed despite the odds. I think that this is a reminder that we all need in today's fast paced world.

Laura Shannon
SW New Mexico

Marijuana Honey?

Never thought I'd have to ask this, but... I gave my nephew a beehive for his birthday this year. He lives in a rural, agricultural area in south GA (USA). His bees have put up a couple of supers of really nice looking honey this year. However, about a week or so ago, one of his neighbors (approx. 1/2 mile away from his hive location) got busted with over 100 acres of cultivated marijuana. I have heard marijuana buds (flowers) are very sticky to the touch, which implies to me that they might have a nectar with a high sugar content, and therefore might be very attractive to honeybees? I was wondering if anyone has had any experience with this, and what, if any, affect this potential floral source might have on the honey?

I'd hate to sell or give some honey to someone and that be the cause of them failing a work or court related drug test. Any information would be welcomed.

A Curious Reader

Editor's Note: *Believe it or not we get this question quite often. The plant you mentioned does not produce nectar, and it is wind pollinated. The "sticky" you mention is actually resin, and has a far different purpose than nectar. Your honey is safe.*

July Cover

When I got my July 2012 issue out of the mailbox a few days ago my first thought was " Wow, different." A little later when I looked at it closer I got a little grossed out. When I found the "game" on page five (you know, where readers are encouraged to find things in the picture) I thought "You CAN'T be serious!?! Well I have a game for you. See if you can find the following: A cat using bedding plants for a litter box. A goat within close proximity of honey supers meant for possible human consumption. A dog chewing on said supers possibly meant for human consumption. Pigeons and chickens running around willy-nilly with their salmonella and death-poop splattering everywhere. Rodent infestation. Vehicle exhaust. A freaky neighbor in a Peta hat. A

health inspector (don't worry he'll show up soon). The cleanest thing about this picture was the bag of elephant manure. Gross, just gross. Please no more covers like this.

Randall & Linda Stewart
Virgie, KY

The Code

The sky is falling.

Within five years, science will crack beloved *Varroa* mite RNA-i mystery.

It won't be easy finding *Varroa's* Code.

We must prevent it.

The potential is stark.

By destabilizing the *Varroa* population, bees will be better able to improve hive health.

Calamity.

For millennia before this globalization opportunity moved non-native parasites onto non-native pollinators on a non-native infested continent.

Hive losses in America supposedly came in around 20% during the Winter of 2011-12.

Some argue the 20% hive-loss levels are sustainable.

Truth be admitted by the apple-polishers who claim these 'sustainable losses'; they lost more bees.

Truth be told, the industry thrives at 'unsustainable' levels.

Truth be told, hive losses are still safely, solidly clocking in around 15-30% per year, every year for the past five years.

Amazing: Bees are able to sustain unsustainable losses . . . year after year.

When Ms. *Varroa* and her children have been destabilized, hive health will improve.

Pollination prices will collapse.

Honey prices will collapse.

Hive loss estimates halve in the *Varroa*-free setting.

Instead of 500,000 dead hives [25% of two million hives],

The national herd loses 250,000 fewer hives.

Plop 90% of those hives into the CA almond market.

Let the ugly game of Cheap Man Wins commences.

Decades-long relationships will be tested.

Smart almond guys already know good bees pay.

But some almond guys will never know good bees pay.

Smart bee guys know smart almond guys know good bees pay.

And some bee guys will get rolled.

The dummy 'honeybees for rent' ads placed by almond guys in the newspapers will roll dummy bee guys.

Prices will fall; along with the sky.

Now add the same 225,000 hives into the national-herd stew.

225,000 hives will produce an 80 pound crop for a 18,000,000# pop in the domestic honey supply.

Packers [Their Motto: Never Forgive. Never forget.] will leverage this 18,000,000 pounds of needed honey production against bee guys who shop and drop domestic packers.

The sky will fall . . . along with the price of honey.

Solving *Varroa* will shame the scientist who cracks the code.

Leave town. Change name.

Smart bee guys must keep secret the Code.

The Skep-tick

Poisoning Bees

I've lived most of my life in Illinois and am old enough to remember summer days loaded with crickets, grasshoppers, spiders, butterflies, and a little of everything else. There are small samples still left here and there but the lack of their abundance and change in populations are important to note. The birds seem scarce by comparison from early days as well. With what happened to those bugs it should not be a surprise having problems keeping bees.

I kept bees for 15 years and have quit for now because I cannot seem to keep a colony alive.

Now we have these neonicotinoids, noted in your most recent issue, that persist in the soil with a 19 year biological half-life. Some day we might find this to be connected to increased human illness as well.

Again, thank you, and thanks to the *Bee Culture* editors for telling us about these poisons.

Peter Wohld

Filtering Honey

How stupid can our government get? Remove pollen they say and that will make the honey more attractive to the buyer!

In my plus 40 years of beekeeping, I have never been more than a hobby beekeeper, but I have never had any problem in selling the many tons of honey my bees have produced. Never has any buyer even suggested that he honey – unfiltered – was not attractive enough to purchase.

Now we are told, "Remove The Pollen." Then go to the Health Food Store and buy your pollen in either capsule or bulk form. Many people that are not necessarily honey consumers do add pollen to their daily diets as a health benefit. I am certain the Chinese are both laughing and applauding the removal of pollen as that will make their importing job much simpler.

Informed beekeepers know how some of the pesticides were approved by EPA without testing or testing that was suspect. How much more serious the pesticide problem has become in recent years is not too well known.

The researchers, defending the chemical industry, say, "change our brood foundation comb every three years." Is that enough? Several years ago I was negligent in protecting comb in Winter killed hives. When I did examine the hives, the old brood foundation was riddled by wax moth larvae.

However for the past two years I have observed that the comb is no longer attacked by wax moths and the can of Para Moth sits unopened on a shelf. My opinion is that chemicals in the old comb are repelling the wax moths. I have not read that wax moths no longer exist. So how can healthy bees be raised in such an environment. This situation is no different than trying to raise a healthy child in a room also occupied by two chain smoking adults!

What is needed are researchers who say, "Get rid of the chemicals that are causing the problem instead of telling us to change the foundation comb!"

And speaking of stupid – Why High Filtration Of Honey?

The jar of honey on the left in the photo was extracted on June 23, 2012. The "raw" honey was allowed to remain in a container for three days. Then the surface layer of beeswax was skimmed off and the honey was put in a jar. Nothing else was done to this jar of honey. This was clover honey.

The jar of honey on the right was purchased from a grocery store and labeled as "Pure Clover Honey." The store-bought honey was in a two-pound plastic container. One pound of the honey was transferred to a glass container. This honey is clearer – I have assumed this to be because of high filtration, but it is also darker. Either it is darker because it is not clover honey or – more likely – because it was overheated to prolong the shelf life.

The important question is "Why remove pollen?"

Pollen is sold in bulk form and also in capsule form as a dietary supplement. Many people who have purchased DuPage county Forest Preserve Kline Creek Farm honey has claimed their allergy's have been improved.

So where is the logic of removing pollen except that removal makes it impossible to trace the possible source of the honey?

Beekeepers must have the high filtration procedure removed from the treatment of honey.

Lawrence DuBose
Carol Stream, IL

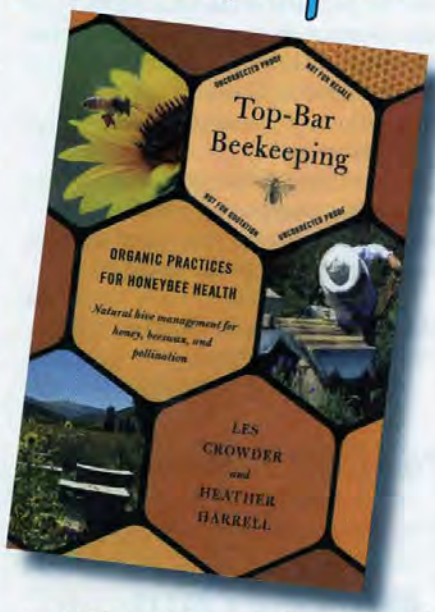
Per Cent Protein?

I was reading Steve Shepard's June "Research Reviewed." On the surface it appears as though the original authors tested patties with 15, 20, 25, 30, and 35% protein. However, if you read the original research article, the authors used pollen supplements that contained 15, 20, 25, 30, and 35% protein to make the patties. This means that if the researchers used their 35% protein supplement and turned it into patties, the resulting patties would actually contain 14% protein on an as fed basis. For example, let's make 100 pounds of patties using the researcher's formula. As per the research review, Yang et al, 2012 used 40 pounds of 35% pollen supplement (which contained 14 pounds of actual protein), 50 pounds of sugar, and 10 pounds of honey to make 100 pounds of patties. To calculate the % protein on an as fed basis, divide the actual 14 pounds of protein by 100 pounds for the total batch which equals 14% protein for the patties. This is an important distinction as beekeepers talk about the amount of protein fed to their bees.

Joe Latshaw
Latshaw Apiaries
New Albany, OH

New For The Beekeeper

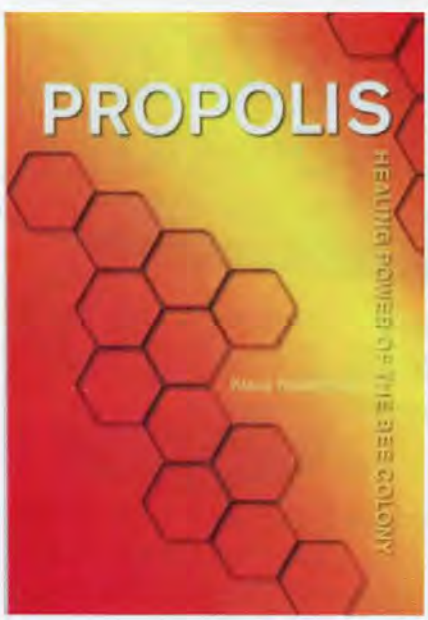
Top-Bar Beekeeping. Organic Practices for Honeybee Health. Les Crowder & Heather Harrell. 6" x 9" 192 pages. Full color. ISBN 9781603584616. Published by Chelsea Green. **www.chelseagreen.com**. $24.95.



This is the first of what seems to be several books on this subject to be coming out this season. Les Crowder keeps his bees in top bar hives in New Mexico, and has for years. That geography is unfortunate because the greatest number of new people keeping bees in top bar hives don't live in the tropics or in the desert southwest. Nevertheless, there is information here that I haven't seen elsewhere – manipulating combs, managing hives for honey production, even moving them...don't, by the way. Still, there's not enough actual information on managing a top bar hive. There's lots for basic honey bee biology, queen rearing, diseases and pests – though because he has selected for totally resistant bees, there isn't a *Varroa* problem in these hives.

I have two top bar hives and they're doing pretty good. I don't expect to get much honey, and it takes a pile of work to protect them in northern winters. But I knew that going in. You won't know that if you read this book though. To me, there's more than enough basic beekeeping here, and not enough how to make a top bar hive work. That's too bad because I suspect Les has a lot more experience than came out here. He mentions wintering in cold climates, but there's not enough infomration, and very little on ventilation. Feeding? How do you feed a cluster hanging on top with a Boardman Feeder? Some beekeepers will treat. How? These are doable, and I'm sure he does them. Just not here.

– *Kim Flottum*



Propolis. By Klaus Nowottnick. Published by Northern Beebooks, available from bookstores on on the web. 68 pages, 6.5" x 9.5". ISBN 9781908904157. Many black and white photos and drawings. $17.25.

The first English translation of an updated German title first published over 20 years ago and since then there have been both Czech and Slovak editions.

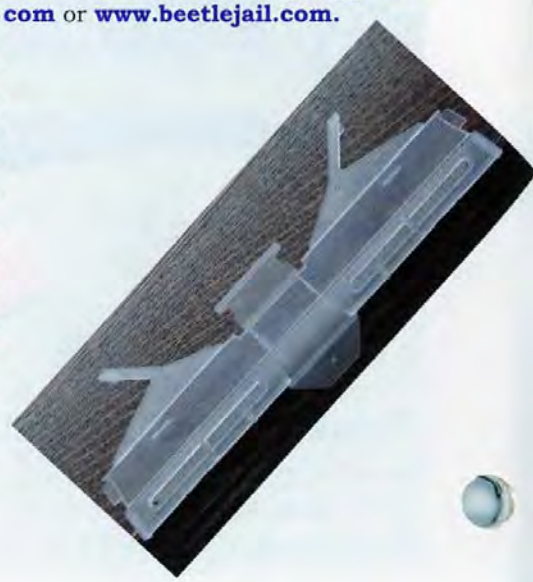
It explains the best methods for harvesting and preparing propolis and gives a wide range of recipes, many of which have been used as folk medicines in Eastern Europe for years. Excellent b&w photos show techniques and equipment.

Beetle Jail Baitable: is an "in hive" reusable small hive beetle trap. New features are:

- an inner bait compartment in the center with a separate lid so the beetle cannot get to the bait, but they can smell the bait through vent slots.
- Only 7 inches long to fit in queen mating nucs and a ¼ inch deeper for more beetles and less spilling
- Top surface is recessed so that it is lower than topbar. Beetles go down into the trap and not under it or along the side of it.
- The lid has small barrier wall on the ends to form a recessed pocket, with the adjacent frame. Beetles are looking for a hiding place and naturally go down into the pocket and into the entrance slots.
- The trap has small tabs on the ends to allow a hive tool to pry it off a frame without opening the lid.
- Made from durable polypropylene, is top shelf dishwasher safe and will give years of service.

Fill the two larger sections of the traps about 1/3 full of oil or diatomaceous earth then add fruits, pollen, or beetles in the bait compartment. Close the bait compartment lid before closing the main lid. The traps will hang on the top of a frame in the hive. The frame may be removed from the hive for inspection without removing the trap. If the trap is removed, it will sit on its flat bottom without spilling.

For more info **beetlejail@gmail.com** or **www.beetlejail.com.**



JUST SO YOU KNOW – TEACHING BEEKEEPING IN CHINA

New and Practical Technology of Beekeeping, by by Zhang Zhongyin, Wu Liming, and Li Weihai in Chinese. Publishing and Distribution: Chemical Industry Press (Dongcheng District Youth Lake South Street Beijing Postal No.:100011). 178 pages, 6.5" x 9.5", black and white throughout. First edition. For info: **http://www.cip.com.cn**. Price – $19.90 RMB, $3.13 USD.

Starting from the living features and characteristics of the bees, this book stresses the management of bee colony, production methods, breeding improved varieties, disease prevention and bee products. The methods and techniques described in this book are standard, advanced and practical; they keep up with the forefront of development of the beekeeping techniques. This book is excellent both in pictures and texts, easy to understand. This book is suitable for beekeepers, technicians in large beekeeping field and amateur beekeepers to read.

From The Preface

Bees are the friends of human beings, and the matchmakers of plants. Keeping bees can produce honey, beeswax, royal jelly, bee venom and other products. Bees can also pollinate crops for increasing crops output and improving their quality.

According to the Views about Accelerating the Promotion of the Techniques of Bee Pollination and Promoting a Sustained and Healthy Development of Beekeeping and "12th Five-Year" Development Plan of National Beekeeping promulgated by the Ministry of Agriculture in China, as well as the influence on the beekeeping production caused by natural disasters and environmental changes in recent years, the author, on the basis of a long-time engagement in the production, teaching, laboratory and demonstration of bee-keeping, has learnt and drawn extensively classical theories and the successful experience from foreign experts. According to domestic needs of modern beekeeping science and technology, through carrying forward the tradition and making innovation, he writes this book of beekeeping with progressiveness, readability and operability together, of which technical system is relatively complete. Its purposes are to make beekeeping production standardized, large-scale, high-qualified and promote the construction of industrialization, to improve the level of quality and safety of bee products, to promote agricultural efficiency and rural incomes, to achieve a sustained and stable development of beekeeping.

This book is one of the achievements of "Chinese Modern Construction of Technical System of Bee Indusrty", it is also the achievement of the promotion of beekeeping techniques by Chinese Beekeeping Society. In the process of writing and publishing, this book gets great help and support from Wu Jie, the chief scientist of this project and the fellow of Bee Institute of Chinese Academy of Agricultural Sciences, Zhang Fuxing, Chairman of the Chinese Beekeeping Association, Chen Lihong Secretary-General, Professor Zhou Bingfeng of Fujian Agriculture and Forestry University, Professor Yu Linfeng of Anhui Agricultural University, Professor Yang Yongguang of Henan College of Science and Technology, and Professor Zachary Huang of Michigan State University. It contains exquisite pictures from such professional websites as **http://photo.bees.net, www.legaitaly.com, http://www.beecare.com, http://www.draperbee.com, http://www.beeman.se/, http://www.mondoapi.it** and so on. Here, to extend the heartfelt thanks to the units and individuals above, and also to the authors whose relevant information is referenced or wonderful pictures from domestic and foreign websites are applied in this book.

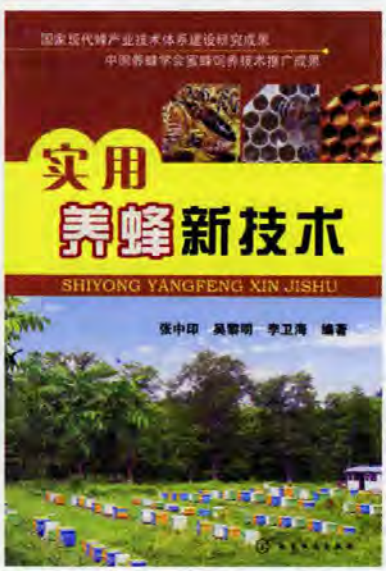


Table Of Contents

INNER COVER

I met Kodua Galieti through a phone call she made to my office. She had a calendar for sale and wanted to know if I'd be interested in doing a new product with it. Sure – send it along. If you've seen it you know it's pretty good. If you haven't, it is. So she sent a bunch. She's a photographer among other things, and a beginning beekeeper, and honey bees have become a passion. It's a not uncommon story.

Turns out she lives in Northridge California (think earthquake) near LA on a small ranch with husband Jeff, a garden, horses and bees. She got her start with horses long ago on her Grandfather's horse farm near Lecompte, Louisiana. She was a rider at six, and a professional by high school, doing rodeo, barrel racing and whatever else it is professional horse people do. After high school she became Miss Rodeo Louisiana, and competed for Miss Rodeo America, then moved to Colorado and went into modeling – what else – women's western fashions. She moved to Nashville and did the same, but then went on a Church mission and discovered photography.

Shortly she moved to California, continued photography but discovered the care and feeding of chimpanzee babies. When a chimp's mother abandons it, humans must take over and raise them – for the movie and television industry. So off and on for many years she was a foster mother to these Hollywood stars. But with the camera one thing became more and more clear. Her years in front of a camera as a model give her some insights into how to use that machine to its best advantage – an experience most of us never have.

When her sister became pregnant she had the routine aces and pains. Back then pregnant women didn't get massages because there wasn't equipment or training to deal with them. Kodua helped develop a table to make this work, and actually went into the business having them manufactured. She had to learn about a manufacturing business and the massage trade at the same time, and developed a technique for pregnancy massage used today in southern California. A natural side line was skin care products and she worked to develop a business there, too. Though she sold it a few years ago the company is still in business as Kodua Naturals.

Kodua in one of the holding yards we visited.

But then she discovered honey bees, and they and her camera sort of became one and the same. Her beekeeping experience is growing, she has over a dozen colonies now, and her global travel with her camera is increasing at the same time.

So when the Almond Odyssey came into being we talked, and having someone taking photos, good, high quality photos while I was doing the talking to all these almond folks seemed like a good idea. So she joined me on the odyssey – her big truck and my contacts and we traveled from Bakersfield to Oakland. You've seen some of what she's done – her photography contacts made that Air Almond story possible, a couple of almond cover shots, and there is much more still to share. And we still have some things to do to actually finish this story, but it'll have to wait until this Fall. And then there's the many projects we actually wrote down that we want to do when time slows and we can get to them. But it will – they are too good to not do. But she did have to learn one thing – magazine covers are shot vertical – not horizontal, and now she occasionally turns that very expensive, sophisticated camera 90 degrees for another possible cover shot. To see more of Kodua's photography go to Koduaphotography.com.

•

Planes and trains and automobiles, and trucks and subways and even a ferry.

I made a whirlwind trip to the New York City metropolitan area in late June that ended up being a pretty intense experience. It began with an invitation to speak to the Long Island Beekeepers Association at their Sunday afternoon meeting, and as long as I was close Marina Marchese of RedBee Honey and I decided to set up a meeting in Weston, Connecticut, where Marina lives, for the following Tuesday with the Editor of the book she and I are working on. Weston is close to Long Island as the crow flies across LI Sound, but far if you have to go the long way.

Then one of the groups in New York City contacted me and said as long as I was in the area and they were meeting on that Monday evening, why not come down. And finally, on Tuesday I was invited to enjoy a peaceful evening at a pot luck supper with the BackYard Beekeepers, of which Marina is now President.

It all seemed good on paper if you didn't consider getting from one place to another in and around the

Photographer Kodua. Planes & Trains & More.

biggest, busiest and most complex urban area I travel to as infrequently as I can manage. Recall, I live in the country, but only seven miles from the office. I have to negotiate one stop sign and two traffic lights to get to work, and it takes, at most, 15 minutes for the entire journey. Generally more than three cars at either of those traffic lights is considered congestion, and more than four cars waiting at the stop sign is a sure sign of overcrowding and a failure of our zoning ordinances to keep housing lots at five acres or more. There are other traffic lights in the city of course...but you can probably count them on both hands...maybe three if I've missed some. That should give you a picture of the bustling city of Medina...all 25,000 of them (not us, I live out of town, remember?)

I was to arrive in New York on Saturday afternoon, stay in a local hotel on Long Island that evening, speak there on Sunday, then travel to Weston, Connecticut after the Sunday meeting, staying there that evening. Monday afternoon I'd head to the Big city to speak that evening, returning to Connecticut later that night. Tuesday we were to meet with the Editor, and Tuesday evening head out to that pot-luck supper with the BackYard Beekeepers, then on Wednesday return to the airport noonish or so, getting back to Medina in time for supper. Sounds not too complicated, right?

The Saturday flight to New York was uneventful and I met my ride easily enough. Off to lunch, then to his house on the Island for a lemonade and bee talk until supper at a local Italian place with good food and company. Breakfast on Sunday with friends, on to the meeting at 2:00 p.m. and all went well.

Time to head out. Now, you can get to Connecticut from the west end of Long Island by driving east to New York City, then turn right and head north to Connecticut. It's a fairly long trip, and it's all city all the way. Or, you can simplify life and take a ferry from Port Jefferson on the north coast of Long Island, across the sound to Bridgeport on the south coast of Connecticut – a 90-minute, $12 trip. It's an easy choice, really – three hours of Sunday afternoon traffic, or 90 minutes of watching the water go by. Ferry it was.

Monday we took the train from Weston to Grand Central Station in the city, walked a bit then hopped on the subway up to the office of the NYC Parks Department where the meeting was and finished that leg of the trip – heading out about 9:30 or so. We caught a bus from the Park Department back to Grand Central, back on the train to Weston, over to the parking lot there, and finally taking the truck the final leg home.

Tuesday was a snap because everything was only 10-15 minutes away. On Wednesday driving to the airport using an IPhone for directions seemed easy, and then home. See, I said it sounded simple – and all in all it wasn't bad – but planes and trains and automobiles, subways and trucks and a ferry – all for three good bee meetings, a talk with an Editor and the chance to visit a lot of good friends. But I tell ya – that 15 minute drive every morning is a real pleasure compared to the hectic, noisy and complicated life in the city. I know some of you think nothing of it everyday, while others smirk over my much ado about nothing. That's OK. It's the country life for me.

•

Sometimes the best laid plans have unintended consequences. Take for instance the definition of honey.

For years various groups in the U. S. have tried to get the FDA to come up with a definition of honey so that when someone claimed something was honey you could say, no, it isn't, and you are not telling the truth. Because, you can't say what something isn't until you can say what it is. But the FDA has bigger fish to fry so they have avoided saying what honey is, or isn't.

So awhile back folks in Florida got fed up with the FDA's lack of action and said...if every state comes up with a definition of honey, the FDA will have to recognize that honey 'is' this, and 'isn't' that. We will, thought the Florida folks, do an end run around them and make it happen without them. That was the plan, and it seemed like a good one.

So Florida enacted a law that said what honey was. Then several other states did the same thing. Ohio even looked into doing it. These were the best laid plans.

But, as you can imagine, beekeepers in one state don't necessarily agree with beekeepers from other states. Rght off definitions of what honey was, and wasn't, weren't quite the same. So instead of doing an end run around FDA, states have begun to set up tiny little trade barriers at their borders... "Our definition of honey is this, and your honey is that, so you can't sell your honey in our state", go the arguments, and the more states that enact their own laws, the more laws you will have...that's the unintended consequence. In reality, it's a Biblical Tower of Babel.

Now if you simply sell your honey at the local farm market and never cross a state line you probably won't be affected...or maybe, because now that big beekeeper who was selling across state lines...from his state into your state and can't anymore because of a new sucrose percent law, or that pollen law says his honey violates your new state law...so now your honey suddenly becomes gold because the supply of honey on the local grocery store shelf is gone...well, maybe you will be affected.

And that pollen thing? There are now lawsuits heading to court that say...if your honey does NOT have pollen in it, it isn't honey. The confusion between ultra-filtering and filtering has run amok and now it seems nobody knows what's going on. Is honey without pollen still honey? Well, if you don't filter your crop as well as a commercial packer does to reduce crystallization, and he can't sell his honey in your market any longer, and you still can...maybe that's not such a bad rule, eh?

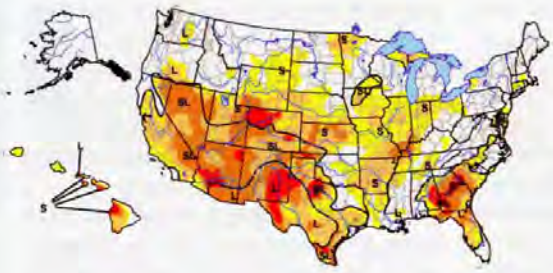
There's a real unintended consequence for you.

•

Meanwhile, Fall preparations are in order, so keep your smoker lit, your veil tight and your hive tool handy. It's time to get back to work.

P.S. I almost forgot, if you subscribe to the paper edition you can peal off that address label and have an unblemished cover. We're trying it for a bit, so let us know if you like it, or not. And if you are a digital subscriber, or are thinking about it, that edition is now formatted to IPhones, Androids and IPads.

AUGUST – REGIONAL HONEY PRICE REPORT



Spring, Honey Crops And Colony Conditions

We looked at Spring weather, honey crops and colony conditions this month. Since all beekeeping is local that's where we started, but it's interesting to note that overall, when added up, local conditions can be useful in predicting national trends. For instance, for all reporters in all regions:

For moisture, 7% too wet, 42% just right and 52% too dry. For temps, 18% too cold, 49% just right and 38% too warm. For the Spring crop – 41% less than usual, 27% average and 32% better than usual. For the Summer crop though – 43% less than average, 44% average and only 13% above average. And how do the bees look in June? 4% terrible, 24% not too bad, 37% about right for June, 30% better than average and only 6% were boomers.

Region 1

Cool and a bit wet, Spring crop OK but Summer not so good, but bees OK.

Region 2

OK to too wet, but too warm, Spring and Summer crops just below average, but bees doing great.

Region 3

Both rain and temps just right, and Spring crop OK but Summer crop down a bit, but bees only average for this time of year.

Region 4

OK to too dry, and OK to too warm, dry areas poor Spring and Summer crop, wet areas doing OK, bees doing OK too.

Region 5

Dry, hot and only average Spring crops and Summer not doing well, but bees looking OK.

Region 6

Temps OK to too dry, too warm has hurt Spring crop but Summer crop OK and bees doing about average.

Region 7

Too dry but temps OK, but Spring crop down as is Summer crop and bees doing mostly OK

Region 8

Very hot, very dry but bees doing OK. Spring crop way down, but bees about where you'd expect them in June.

Region 9

Everything about as average as you can get according to reporters here…but average is hot, dry, not so good Spring crop and bees doing only OK.

Region 10

OK to too dry and OK to too cold, depending on which part of the region you are in. A good spring and a good summer crop so far, most of the bees doing OK…not so good where it was dry and cold.

Region 11

Dry, dry, dry, and hot, hot, hot, and no Spring crop at all. A barely average Summer crop and bees doing OK to pretty good, but it's not all roses.

Region 12

Wet and cold in the north, hot and dry in the south. Spring crops down across the region and the same with Summer crops. Bees just average so far.

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.81	2.03	1.81	1.57	1.81	1.55	1.93	1.81	1.80	1.85	1.83	1.87	1.54 -2.05	1.82	1.76	1.69
55 Gal. Drum, Ambr	1.71	1.75	1.71	1.54	1.71	1.45	1.89	1.71	1.60	1.71	1.73	1.60	1.45 -2.00	1.69	1.64	1.65
60# Light (retail)	171.25	175.00	157.45	145.00	157.45	165.00	140.57	165.00	110.00	150.00	150.00	165.75	110.00 -210.00	154.90	157.26	146.77
60# Amber (retail)	168.75	185.00	144.85	153.00	144.85	129.00	135.80	165.00	100.00	144.85	140.00	154.33	93.00 -190.00	148.21	150.78	144.16
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	77.53	81.67	48.00	68.15	72.71	60.00	51.99	72.71	72.71	49.92	58.50	79.80	37.20 -120.00	66.83	61.86	66.95
1# 24/case	116.24	103.85	106.20	84.73	110.59	98.48	87.44	91.80	110.59	110.20	93.84	115.75	72.00 -168.00	101.18	101.58	89.49
2# 12/case	110.16	77.46	76.80	73.50	87.01	85.62	80.81	96.00	70.00	85.08	60.33	95.25	34.00 -144.00	85.02	83.89	79.37
12.oz. Plas. 24/cs	99.28	89.84	67.20	70.00	92.91	80.00	68.65	83.40	92.91	64.08	77.60	84.00	60.00 -152.00	79.82	75.59	72.81
5# 6/case	126.90	92.76	96.00	82.23	101.84	108.00	86.87	97.50	101.84	88.98	63.39	102.75	38.68 -180.00	94.33	90.49	87.32
Quarts 12/case	135.00	174.44	142.80	107.38	130.44	95.33	111.12	108.00	130.44	131.65	103.39	133.00	66.00 -220.00	117.87	121.60	118.65
Pints 12/case	72.00	95.48	87.30	62.56	77.94	57.50	71.49	59.40	52.00	111.00	65.25	78.00	48.00 -120.00	71.88	74.54	82.14
RETAIL SHELF PRICES																
1/2#	3.89	4.13	3.30	3.75	3.59	3.50	3.18	2.19	3.59	3.25	3.37	5.00	2.15 -5.00	3.61	3.71	3.39
12 oz. Plastic	5.43	5.07	3.80	4.15	4.75	4.25	3.88	4.43	4.75	3.58	4.58	5.19	2.99 -7.00	4.50	4.47	4.09
1# Glass/Plastic	6.23	6.36	6.12	5.75	6.14	6.23	4.91	5.80	6.14	5.80	5.51	8.50	3.00 -9.75	5.91	5.92	5.38
2# Glass/Plastic	11.30	9.74	10.87	11.10	10.43	9.00	8.56	8.90	7.00	9.57	7.05	12.33	4.46 -18.00	9.62	9.38	8.69
Pint	7.75	8.92	8.50	6.86	8.78	6.46	8.55	7.09	5.00	8.67	9.11	8.78	4.89 -14.50	7.86	7.78	7.94
Quart	14.50	14.70	14.00	12.62	13.71	10.71	11.74	13.90	9.00	14.83	11.13	16.26	6.25 -23.00	12.80	12.58	12.44
5# Glass/Plastic	23.80	18.66	24.00	20.25	20.23	20.23	19.20	21.50	20.23	23.00	16.06	25.00	11.00 -30.00	19.96	21.73	19.41
1# Cream	9.40	6.73	7.50	5.98	9.12	9.12	6.07	5.49	9.12	5.55	9.62	9.00	3.99 -18.10	7.20	6.52	6.20
1# Cut Comb	9.25	7.65	8.99	9.08	8.99	5.25	7.35	8.99	8.99	9.50	7.38	14.00	4.15 -15.00	8.40	7.84	7.73
Ross Round	9.75	7.95	7.62	5.63	7.62	7.62	7.12	8.50	7.62	7.62	8.10	7.60	5.25 -10.00	7.61	7.32	7.06
Wholesale Wax (Lt)	4.60	4.32	5.00	3.25	4.79	5.50	4.03	5.00	4.79	5.75	4.38	4.00	2.25 -8.00	4.45	3.43	4.20
Wholesale Wax (Dk)	4.30	4.98	4.24	3.02	4.24	5.50	3.73	5.00	4.24	3.50	2.92	4.00	2.00 -7.00	3.97	2.76	3.61
Pollination Fee/Col.	80.60	97.25	72.50	52.00	85.84	55.00	57.17	75.00	85.84	60.00	62.00	107.50	35.00 -165.00	71.68	75.11	70.79

It's Summers Time –

An Adventure

I have just returned from an incredible adventure. I went home, to my original home – Littlefield, Texas after about 35 years. In some ways it's very different than when I was a child, but in some ways much the same.

It's not very often that I take a vacation without Kim. He was in New York and Connecticut speaking in meetings. Much of the time we travel together or he's gone and I'm at home. And when we're both gone my son, Grant comes out and takes care of the cats, plants and now chickens. But Grant went with me this time, so he had to get his roommate to take care of his dog and cat, and his brother Matt who now lives in California also went on this adventure. So we had to rely on the wonderful neighbors we have – that's right, the one's with the pony, goat, dog and little boy.

We started the week in Baton Rouge where Matt bowled in a tournament for two days. It was hot but they do air conditioning well in the south and you almost needed a coat inside the bowling center. From the time my two boys were four and five they have bowled in leagues on Saturday mornings. So for about 15 years I spent every Saturday morning, if I was in town, at the Medina bowling alley. Bowling has been a part of our lives. Grant has always been a social bowler, like me. We just like to have fun and hang out with our friends. Matt, on the other hand very quickly became very serious about his bowling and has remained so. I still enjoy watching him as much today as I did when he was little. We had a great time in Baton Rouge. We stayed at a riverboat casino. I'll admit I made a couple of brief visits to the slot-machines, but didn't come home rich.

Then mid-week the three of us flew to Lubbock, Texas where we met up with my two brothers, my sister, two sisters-in-law and one niece to start the real adventure. A visit back in time to our home town, Littlefield. None of us had been back there any time recently except my sister who has gone back for class reunions occasionally. Besides just seeing my brothers who I hadn't seen in four years I had an agenda that included finding my grandmother's house, finding all of the many houses we lived in, visiting the cemetery of course, and driving down Main Street. Main Street housed the movie theater where my mother worked for 17 years while raising these four children.

Well my grandmother's house was still there, a little shabbier than we remembered but still standing. Some of the houses we lived in were vacant lots now and a couple we simply couldn't find because our memories are failing. Sadly, Main Street is mostly boarded up and the theater is also a vacant lot. So there was some sadness in the visit.

We were able to spot the family plot at the cemetery. My grandmother and grandfather, and three uncles are buried there. Turns out the day we were there was my grandfather's birthday.

The other part of my agenda was to spend time asking my older siblings many questions about years gone past. They are all quite a bit older than me and fortunately were tolerant of my questions and helped me fill in some blanks that I was unclear on. It was a wonderful visit.

If you haven't ever been to the panhandle of Texas it's very flat and very brown and very hot, just as I remembered. That part hasn't changed. But some things were very different. The population remains about the same, just over 6,000, but there is a McDonald's in town now and a Sonic Burger – unheard of when we were kids. We had the drive-in burger place where the girls roller-skated out to your car – I'm not kidding! Just like on *Happy Days*. Main Street was the hub on Friday and Saturday nights. Teenagers would "drag main" which consisted of driving back and forth, turning around at each end, sometimes switching cars along the way, for hours and hours.

Littlefield has a claim to fame. If you've heard of Waylon Jennings, this is where he was born and raised. My sister went to school with him and remembers him as a teenager and young adult struggling to make it as a star. There is a Waylon Jennings museum located in the back room of the local liquor store, which used to be a gas station owned by his dad. The business is still in the family.

So you can go home and I would encourage you to if you have the opportunity. It will be an adventure you won't forget.

I hope you are enjoying Summer – the gardens, the bees, the heat.

Happy Summers

A Closer LOOK

DRONE SEMEN STORAGE

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

The development of practical techniques for the storage of honey bee semen would significantly improve our ability to breed for desirable genotypes and maintain genetic diversity in populations.

Honey bee breeding is presently facing important challenges due to the need to breed bees that are tolerant or resistant to introduced or formerly unknown pathogens and parasites. At the same time, the diversity of the available gene pool is rapidly decreasing, with many subspecies and ecotypes of *Apis mellifera* facing massive introgression of foreign genotypes (De La Rúa et al. 2009). The development of a practical means to store drone semen would enhance the bee breeder's ability to select and maintain superior honey bee stocks. A number of storage techniques have been tried with some success, using both ultra-cold freezing and non-frozen approaches (Collins 2000a).

Various assays have been used to evaluate the success of semen storage including: assessing semen quality based on spermatozoa motility (Kaftanoglu and Peng 1984; Swada and Chang 1964), counting the number of spermatozoa in the queen's spermatheca (semen storage organ) of an instrumentally inseminated queen (Bolton and Harbo 1982; Harbo 1979b, 1983; Harbo and Williams 1987; Kaftanoglu and Peng 1984) and comparing the proportion of worker pupae (from fertilized eggs) to drone pupae (unfertilized eggs) produced by an inseminated queen (Harbo 1979b, 1983; Poole and Taber 1970; Taber and Blum 1960). Harbo (1979a) also measured egg hatching rate. However, these *in vivo* (in life; experiments done in a system in which the organism remains intact) techniques are costly in terms of time and labor, and (in the case of sperm number in the spermatheca) require the sacrifice of the tested queens. Several authors have also used partly subjective motility estimates of undiluted or slightly diluted sperm (Cobey 2007; Kaftanoglu and Peng 1984; Hopkins and Herr 2010), and frozen-thawed semen has twice been found to be indistinguishable or even superior to unfrozen semen regarding this indicator (Kaftanoglu and Peng 1984; Hopkins and Herr 2010).

Techniques to effectively store semen must meet some minimally acceptable level of spermatozoa survival. To determine this level, Collins (2000a) inseminated queens using various mixes of fresh and freeze-killed semen, and they were allowed to lay eggs in small colonies for three weeks. The queens receiving all freeze-killed spermatozoa (0% fresh) had no spermatozoa in their spermathecae, and produced only drone pupae (unfertilized eggs). The proportions of live and dead spermatozoa (determined by dual fluorescent staining) (Collins and Donoghue 1999) in the spermathecae of queens receiving 25 to 100% fresh semen were not significantly different at 27 days post-insemination. Queens receiving 50% fresh semen or more produced only worker pupae (all eggs were fertilized). Thus, she concluded that a program to improve storage of semen should only have to reach survival levels of 50% of the spermatozoa to have functional semen.

Instrumental insemination of queens has been possible for some

"Non-frozen storage of honey bee semen has potential for short-term preservation of germplasm, however several factors need to be studied further to optimize survival rates."

time, the semen used is usually freshly collected, or held for <1 week at room temperature. Maximum storage life at room temperature for honey bee semen is approximately two weeks (Cobey 2007). Collins (2000b) examined the limitations of spermatozoa survival at nonfrozen temperatures. Pooled, diluted semen was stored in sealed capillary tubes at room temperature (25°C) or in a refrigerator set to 12°C, for periods up to one year. Survival of spermatozoa was assayed by a dual fluorescent staining technique using SYBR-14 and propidium iodine stains, which readily distinguishes live and dead cells. No significant loss of viable spermatozoa occurred within the first six weeks. Between weeks six and nine, the percent live spermatozoa fell from 80 to 58%, and remained at that level until after 39 weeks. By week 52, samples at room temperature, but not at 12°C, fell to 18.9% live spermatozoa. Non-frozen storage of honey bee semen has potential for short-term preservation of germplasm, however several factors need to be studied further to optimize survival rates.

The effect of semen storage time, drone age and semen contamination on honey bee semen quality was investigated using assays for motility and viability of semen *in vitro* (in glass; experiments done in a cell free system) (Locke and Peng 1993). Four age groups (one, two, four and six weeks) and five storage times (zero, one, two, four and six weeks) were examined. As storage time increased, sperm viability and motility significantly decreased. However, motility patterns of unstored semen samples were significantly lower than those samples that were stored up to two weeks.

Sperm viability decreased significantly with increasing drone age, but motility patterns did not change. Those semen samples that were found to be contaminated with foreign particles or microorganisms had a significantly lower mean viability than uncontaminated samples.

The development of practical techniques for the storage of honey bee semen would significantly improve our ability to breed for desirable genotypes and maintain genetic diversity in populations. In this situation, techniques for the cryopreservation of honey bee semen could be of great benefit for both conservational and breeding purposes. The development of such techniques is hampered by honey bee reproductive biology. Queens are mated shortly after emergence and then store the semen inside their spermatheca for the rest of their lives, typically two to five years. This means that frozen-thawed semen has to retain the capacity of long-term storage inside the spermatheca, and sufficient fertility for the production of several hundred thousands of fertilized eggs (Wegener et al. 2012).

Harbo (1977) was successful in producing worker progeny from queen honey bees inseminated with semen that had been stored in liquid nitrogen. The cryoprotectant was DMSO (dimethyl sulfoxide). Queen bees inseminated with a semen mixture (60% semen, 30% saline and 10% DMSO) that was stored in liquid nitrogen retained 41% as many spermatozoa in their spermathecae as control queens. Without DMSO as a cryoprotectant, the sperm did not survive liquid nitrogen storage.

While spermatozoa with a cryoprotectant have survived storage in liquid nitrogen (Harbo 1977, 1979b), if this method is to be practical, the effect of time in storage on the survival rate must be determined. Generic markers showed that spermatozoa of the honey bee can produce progeny after storage for two years at -196°C. (Harbo 1983). Progeny counts indicated that a loss of viability may have occurred between four days and two years of storage. Nine queens inseminated with spermatozoa stored four days produced 22% worker brood (range = 8-55%); eight queens inseminated with spermatozoa stored two years produced 8% worker brood (range = 1-25%).

Additional research was completed to further refine this storage technique (Harbo 1986). Honey bee semen was treated as follows: 1) diluted in saline with 10 percent dimethyl sulfoxide (DMSO) and stored at -196°C; 2) same treatment but stored at 12°C; 3) diluted in saline and stored at 12°C; and 4) undiluted, unstored semen. Daughters (queens) produced from the treated spermatozoa were evaluated for total sterility. Only sterile eggs were produced from three percent of the queens in both groups that had DMSO (5/166 in group one, and 6/234 in group 2). They were different ($P < 0.05$) from groups three and four in which no queens were produced that laid only sterile eggs (0/151 and 0/137, respectively). These results demonstrate that, under the conditions used, a low level of sterility is induced by DMSO, and this F_1 sterility raises questions about possible genetic damage by DMSO.

Given the threats to the intraspecific biodiversity of *Apis mellifera* and the pressure on bee breeding to come up with disease-tolerant lines, techniques to

cryopreserve drone semen are of great interest (Wegener and Bienefeld 2012). Freeze-thawed drone semen of high viability and/or motility has repeatedly been obtained, but fertility of such semen, when it was measured, was always low. The cryoprotective agent most frequently used with drone semen is dimethyl sulfoxide (DMSO), although this substance has been suspected of causing genetic damage in sperm. No form of sperm washing is currently performed. Using a membrane permeability assay, Wegener and Bienefeld (2012) measured the short-term toxicity of four possible replacements for DMSO, 1,3-propane diol, 2,3-butane diol, ethylene glycol, and dimethyl formamide. They also tested whether the practice of inseminating queens with cryoprotective agent-containing semen affects sperm numbers in the storage organs of queens, or sperm fertility. In addition, they tested whether cryoprotective agent-toxicity *in vivo* can be reduced by using mixtures of two cryoprotective agents, DMSO and ethylene glycol. Their results show that, although short-term toxicity of all cryoprotective agents tested was low, the presence of single cryoprotective agents in insemination mixtures at concentrations required for slow freezing greatly reduced the number of sperm reaching the spermatheca. Contrary to earlier reports, this was also true for DMSO. Ethylene glycol was additionally shown to reduce the viability of spermatozoa reaching the storage organ. Mixtures of DMSO and ethylene glycol performed better than either substance used singly at the same concentration. They concluded that the toxicity of cryoprotective agents, including DMSO, on honey bee semen and/or queens has been underestimated in the past. This could partly explain the discrepancy between *in vitro* and *in vivo* quality of cryopreserved drone semen, described by others. Combinations of several cryoprotective agents and techniques to partly remove cryoprotective agents after thawing could help solve the problem.

The development of cryopreservation protocols for drone semen is a multifactorial problem, involving the optimization of freezing rate, thawing rate, the nature and concentrations of cryoprotectants, and the composition of a suitable diluent. Development of cryopreservation protocols for honey bee semen is hampered by the lack of validated laboratory tests that allow the prediction of *in vivo* performance of frozen-thawed semen. Wegener et al. (2012) analyzed correlations between seven *in vitro* tests and indicators of semen performance after insemination. These tests included measures of motility, cell conformation, and membrane permeability before and after exposure to physiochemical stress. They showed that the proposed protocol for motility measurement yields results that correlate well with the number of sperm reaching the storage organ of queens (spermatheca) (correlation coefficient q =0.67) and the proportion of viable eggs in inseminated queens (q = 0.48). The conventional live/dead assay of membrane permeability by dual fluorescent staining and a new test based on the leakage of the glycolytic enzyme glucose-phosphate-isomerase (GPI) from damaged cells were also correlated to the number of sperm reaching the spermatheca (q = 0.54 and 0.61, respectively). They concluded that motility, live/dead-staining and the assay for GPI-leakage are valuable tools for the improvement of cryopreservation of honey bee semen.

Hopkins and Herr (2010) also investigated honey bee spermatozoa cryopreservation by studying factors that might reasonably have affected post-thaw viability. These factors included the type and concentration of cryoprotectant, the effect of cold shock, freezing rates and general temperature sensitivities. Cryoprotectants are molecules that prevent intracellular ice; ice being the primary damaging agent. Cold shock is the term used when cells are damaged by too quickly cooling to temperatures just above freezing (Kaftanoglu and Peng 1984). The cells of some species need to be cooled slowly to just above freezing, whereas the cells of other species can be cooled quickly without injury.

Hopkins and Herr (2010) investigated two freezing rates, programmable freezing and rapid freezing. The rapid freezing method was an attempt to achieve a vitrified amorphous state of water (suppress the formation of ice crystals). Programmable freezing is a technique where samples are cooled slowly and ice is encouraged to form out of the cells, effectively dehydrating cells and preventing intracellular ice. In contrast, vitrification is an attempt to cool so fast ice crystals have no time to form either inside or outside cells; the minimum cooling rate has been estimated to be 30,000°C/min. This minimum rate though depends on cryoprotectant type and concentration. In order to accomplish this rate, samples must be tiny and have a sufficiently high surface area to volume ratio. The small volume of semen produced by honey bees made it an attractive candidate for the vitrification approach. The least toxic cryoprotectant was DMSO. Spermatozoa

were tolerant to temperatures up to 40°C. A programmable freezing rate of 3°C/min proved superior in most treatments when compared to a freezing rate of approximately 28,000°C/min. Highest viability of spermatozoa (93%) post cryopreservation resulted from the treatment containing a 10% DMSO diluent, slow cooled to just above freezing, and frozen at a rate of 3°C/min. Spermatozoa frozen in such a manner yielded viability and motility indistinguishable from that of unfrozen semen. These results warrant a field study. BC

References

Bolton, A.B. and J.R. Harbo 1982. *Numbers of spermatozoa in the spermatheca of the queen honeybee after multiple inseminations with small volumes of semen.* J. Apic. Res. 21: 7-10.

Cobey, S.W. 2007. *Comparison studies of instrumentally inseminated and naturally mated honey bee queens and factors affecting their performance.* Apidologie 38: 390-410.

Collins, A.M. 2000a. *Relationship between semen quality and performance of instrumentally inseminated honey bee queens.* Apidologie 31: 421-429.

Collins, A.M. 2000b. *Survival of honey bee (Hymenoptera: Apidae) spermatozoa stored at above-freezing temperatures.* J. Econ. Entomol. 93: 568-571.

Collins, A.M. and A.M. Donoghue 1999. *Viability assessment of honey bee spermatozoa by the use of dual fluorescent staining.* Theriogenology 51: 1513-1523.

De La Rúa, P., R. Jaffé, R. Dall'Olio, I. Muñoz, and J. Serrano 2009. *Biodiversity, conservation and current threats to European honeybees.* Apidologie 40: 263-284.

Harbo, J.R. 1977. *Survival of honey bee spermatozoa in liquid nitrogen.* Ann. Entomol. Soc. Am. 70: 257-258.

Harbo, J.R. 1979a. *Egg hatch of honey bees fertilized with frozen spermatozoa.* Ann. Entomol. Soc. Am. 72: 516-518.

Harbo, J.R. 1979b. *Storage of honeybee spermatozoa at -196°C.* J. Apic. Res. 18: 57-63.

Harbo, J.R. 1983. *Survival of honey bee (Hymenoptera: Apidae) spermatozoa after two years in liquid nitrogen (-196°C).* Ann. Entomol. Soc. Am. 76: 890-891.

Harbo, J.R. 1986. *Sterility in honey bees caused by dimethyl sulfoxide.* J. Hered. 77: 129-130.

Harbo, J.R. and J.L. Williams 1987. *Effect of above-freezing temperatures on temporary storage of honeybee spermatozoa.* J. Apic. Res. 26: 53-55.

Hopkins, B.K. and C. Herr 2010. *Factors affecting the successful cryopreservation of honey bee* (Apis mellifera) *spermatozoa.* Apidologie 41: 548-556.

Kaftanoglu, O. and Y.-S. Peng 1984. *Preservation of honeybee spermatozoa in liquid nitrogen.* J. Apic. Res. 23: 157-163.

Locke, S.J. and Y.-S. Peng 1993. *The effects of drone age, semen storage and contamination on semen quality in the honey bee* (Apis mellifera). Physiol. Entomol. 18: 144-148.

Poole, H.K. and S. Taber III 1970. *In vitro preservation of honey bee semen enhanced by storage at 13-15°C.* Ann. Entomol. Soc. Am. 63: 1673-1674.

Swada, Y. and M.C. Chang 1964. *Tolerance of honey bee sperm to deep freezing.* J. Econ. Entomol. 57: 891-892.

Taber, S. III and M.S. Blum 1960. *Preservation of honey bee semen.* Science 131: 1734-1735.

Wegener, J. and K. Bienefeld 2012. *Toxicity of cryoprotectants to honey bee semen and queens.* Theriogenology 77: 600-607.

Wegener, J., T. May, U. Knollmann, G. Kamp, K. Müller and K. Bienefeld 2012. *In vivo validation of in vitro quality tests for cryopreserved honey bee semen.* Cryobiology (Article In Press).

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

Managed Pollinator CAP
Coordinated Agricultural Project

Impacts of *Varroa* Parasitism On Honey Bee Health

Katherine **Aronstein** and Angela **Douglas**
USDA, Bee Research Lab, Weslaco, TX; and Dept of Entomology, Cornell, Ithaca, NY

Lessons Learned

In recent years, an urgent demand for answers to declining bee populations has spurred an avalanche of publications attributing the disappearance of managed bees to a variety of causes (e.g., cell phones and microwave technology, earth's magnetic field, etc). Although most of these "discoveries" were quickly rejected by the scientific community, they may have temporarily confused the public and funding agencies, and led to a belief that the Colony Collapse Disorder (CCD) problem has been solved. A strong temptation to provide an instant panacea for the decline in world's bee populations still creates heightened incentives in producing sensational news. However, this problem probably relates more to human nature rather than research efforts.

A critical evaluation of a research publication is key in preventing further confusion. To help the public interpret scientific results, a critical analysis of CCD-related publications can be found at Randy Oliver's ScientificBeekeeping.com web site. However, creating the right conditions for well designed and executed studies requires an integration of expertise and funding that ultimately lead to the best research quality assurance.

Bees In *Varroa* Infected Colonies Are ***Profoundly*** Unhealthy

Tackling complex issues requires a mixture of skills and integration of academic and applied science. This is where the multi-institutional collaboration of academic and extension research groups becomes relevant to repair perceptions and to offer new grounds for hope to solving the problem. Several years of work consolidated under the Coordinated Agricultural Project (CAP) has allowed us to do just that. In a unique collaboration of universities and government scientists, we were able to apply a diverse set of skills and expertise to solving problems related to the decline of bees. For example, we implemented a coordinated multi-state approach to improving bee management in stationary settings. This part of the project is not only the most critical element of the CAP (Lead, Keith Delaplane), but will also become the most critical element in the analysis of stationary vs. migratory beekeeping practices, currently conducted under USDA-ARS Area Wide Project (Lead, Jeff Pettis).

Within the overall CAP structure, smaller groups are focusing on a variety of specific questions, including developing genetic markers for breeding a better bee, looking at the synergistic effects of diseases, parasites and pesticides; studies that are regularly described in our column in this magazine. Concluding reports of the CAP studies will be presented later this year at the Entomological Society of America meeting in Knoxville, Tennessee (November 11-14, 2012).

Bee health and colony productivity remain at the center of our attention. Although it will take some time to complete and analyze our findings, the current consensus among most scientists is that ***global collapse of managed bees is caused by a combination of different factors*** that may compromise bee health by reducing their ability to fight diseases, impairing bees' ability to learn and retain memory, and therefore affecting basic functions of the colony. Among these factors, some show a stronger impact on the colony health than others. It is not surprising that *Varroa*, once again, surfaces as one of the highest impact factors affecting colony survival.

Varroa syndrome is a complex problem and historically has been a key concern for beekeepers. It is not just the feeding activity of the parasite that demises the colony. Instead, it's the co-evolved relationship of the parasite with viruses that ultimately affects the ability of nutritionally depleted bees to resist this coordinated attack.

How does *Varroa* parasitism impact health of bees? We have recently investigated this in a small-scale study conducted in Texas in 2010. We began our experiment by infesting clean bee colonies with known numbers of *Varroa* mites and then monitored the level of mite infestation on a monthly basis thereafter. We used all new equipment and a reliable food source. Also, no chemicals were used in or near the colonies to reduce exposure to pesticides. Following mite infestation, samples were collected on a monthly basis. Pupae and newly emerged adults were scored as *Varroa*-infested or uninfested, and foragers were collected as they approached the colony entrance. Individual bees were weighed, and then analyzed in two molecular laboratories equipped for different types of analysis. The effects of *Varroa* parasitism on bees' immune system were analyzed at the USDA laboratory in Weslaco, TX and the levels of nutritional indices, includ-

ing protein, sugar and lipid contents were measured at Cornell University, NY.

***Varroa* parasitism had no significant effect on the expression level of honey bee antimicrobial peptides.**

It is well known that healthy animals can build up a variety of immune responses to microbial infections and septic wounds, and rapid production of antimicrobial peptides (AMPs) is one of the steps in this process. AMPs are small bioactive molecules normally released in blood of infected animals. However, immune suppressed individuals mount much less pronounced responses. In an important set of experiments, scientists[1] injected bees with heat-killed bacteria and found that the AMP response was suppressed in *Varroa*–parasitized bees. These data suggested that *Varroa* infestation may suppress the bee immune system.

This study on field colonies of honey bees gave very different results. There was no suppression of AMPs in *Varroa*-parasitized bees relative to uninfested bees (in fact, some AMPs were up-regulated), indicating normal function of this part of humoral immunity. Importantly, all tested bees had various levels of Deformed Wing Virus (DWV) with the highest titers found in bees with visibly deformed wings, clinical signs of DWV (Fig 1). Consistent with the conclusion that *Varroa* does not necessarily affect the honey bee's ability to activate immune-related molecules, another study[2] has demonstrated that *Varroa* parasitism tends to affect genes involved in olfaction and neuronal sensitivity, indicating the importance of behavioural (e.g., grooming, removal of infested pupae) rather than immune responses for honey bee survival.

***Figure 1**. Bees collected in colonies highly infested with* Varroa *mites showing clinical signs of DWV. Note gradations of wing deformities.*

Bees in *Varroa*-infested colonies are profoundly unhealthy.

Similar to previously published results, we found that bees in *Varroa* infested colonies have depressed body weight. Importantly, uninfested bees collected from highly infested colonies also had reduced weight in comparison to those collected from colonies with lower levels of infestation (Fig 2), indicating that *Varroa* can affect the wellbeing of an entire colony, even uninfested individuals. Colony level effects are uniquely characteristic to social organisms that collectively tend for their young, share food resources, and defend their colony. These effects may explain a decline of the entire bee colony under extreme stress.

Weight of brood, newly emerged bees and foragers are good predictors of bees' ability to perform normal colony functions, especially their ability to fly, a high energy demanding task. It has previously been demonstrated that underweight bees tend to become precocious foragers with an increased incidence of drifting off-site[3], therefore contributing to a rapid dwindling of adult population in *Varroa*-infested colonies.

***Varroa* infestation affects bee nutrition.**

In addition to a significant reduction in body weight, *Varroa* parasitized bees were nutritionally depleted; they had significantly reduced density of total body proteins and lower content of body sugars. It appears that *Varroa* parasitized bees have an increased energy demand that accelerates the rate of body sugar consumption.

The role of diet in helping bees tolerate *Varroa*.

The relationship between animal health and nutrition is a fast developing field of research. It is well known that malnutrition weakens animals' ability to survive under stress. Although several diets have been developed to supplement bee nutrition, scientists continue improving these supplements in an attempt to provide nutritional support equal to or better than that achieved with plant pollen. It seems that natural pollen consistently outperforms artificial diets. Nutrients in natural pollen contain a variety of proteins, lipids, amino acids, vitamins and minerals, all of which play crucial roles in bee health. Molecular studies showed that diets containing natural pollen helped to activate essential metabolic pathways in bees and had positive influence on the expression of genes affecting bee longevity and production of the antimicrobial molecules. Therefore, improving bee supplements and developing season-specific feeding regimens are critical for the sustainability of beekeeping. However, the role of supplemental feeding in improving survival of *Varroa* –parasitized colonies still waits conclusive evidence. The complexity of this issue is aggravated by the fact that some bee viruses have been implicated in the inhibition of protein metabolism essential for bee health. The "Big Unknown" is, therefore, whether supplemental feeding would be able to reverse the inhibiting effects of *Varroa*-transmitted viruses. One study [4] indicates that harmful effects imposed by viruses were not reversed by supplemental pollen intake. This could be an impediment to the development of a nutritional support for *Varroa* infested colonies, and undoubtedly will be the focus of future investigations.

To help beekeepers understand the complexity of these problems, we highly recommend a newly released book that has already received glowing reviews from its readers (**http://www.bioone.org/doi/pdf/10.1653/024.095.0145**). The book is entitled "Honey Bee Colony

Figure 2. *High variation in sizes of uninfested brown-eyed pupae collected from a highly infested colony. Note significantly reduced sizes of all body compartments.*

Health (Eds., SAMMATARO, D. AND YODER, J. A.) 2012. Twenty one chapters of this book were written by leading scientists in the field discussing a wide range of issues including bee nutrition, diseases, pests and parasites and many other subjects related to bee research. BC

REFERENCES

1. Yang, X. and D.L. Cox-Foster, *Impact of an ectoparasite on the immunity and pathology of an invertebrate: Evidence for host immunosuppression and viral amplification* Proceedings of the National Academy of Sciences of the United States of America, 2005. **102**(21): p. 7470-7475.
2. Navajas, M., et al., *Differential gene expression of the honey bee Apis mellifera associated with Varroa destructor infection* BMC Genomics, 2008. **9**: p. 301.
3. Bowen-Walker, P.L. and A. Gunn, *The effect of the ectoparasitic mite, Varroa destructor, on adult worker honey bee (Apis mellifera) emergence weights, water, protein, carbohydrate and lipid levels.* Entomologia Experimentalis et Applicata, 2001. **101**: p. 207-217.
4. Alaux, C., et al., *Nutrigenomics in honey bees: Digital gene expression analysis of pollen's nutritive effects on healthy and varroa-parasitized bees.* BMC Genomics, 2011. **12**: p. 496.

Planning A Beekeeping Business II

Customers

We live in a time when U.S. agriculture has moved away from small farms to far fewer large, corporate agribusinesses. This has concentrated the agriculture industry and consolidated the bulk of our food production to a few large producers. Efficiency, low cost production, improved distribution systems, and the use of chemicals and machinery are the hallmarks of corporate agriculture. They have kept food prices low by increasing crop yields, lowering labor costs, and spreading input expenses over a vast yield. This is a global agriculture capable of delivering a limitless variety of food choices 12 months of the year.

In contrast, we have watched the number of small farms shrink as owners can no longer stay profitable or compete in markets dominated by agribusiness corporations. Entering national or global markets requires farmers, and beekeepers are farmers, to produce high volume yields and sell at low prices. You must meet the demand and win market share by having the lowest price. The small-scale honey producer with a higher cost of production must cut their income, or profit, to keep prices competitive. Eventually the farmer or small apiary owner can no longer earn a living wage. To stay in business the small honey producer must maintain prices that pay the cost of production and pay the beekeeper a livable wage.

Remember the old joke "A farmer complained he was losing money on every bushel of corn he sold. Next season he would make up his losses by selling more bushels." The same applies to a beekeeper – if you are losing money on one jar of honey, then you are losing money when you sell a case or a thousand jars. The price of a pound of honey is the basic measurement in a beekeeping business. The price must cover the cost to produce it, the business' operating expenses, the insurance, the interest on debt, and your salary. Sounds like a lot of responsibility for a pound of honey. I stress this because my observation has been that many beekeepers give their honey away, or do not know how much it costs to produce it. They enter beekeeping as a business, but cannot break out of the startup phase were more money is spent then is earned. It eventually ends when the beekeeper acquires too much debt and forfeits their investment.

In spite of this competitive backdrop, these are times a small business can make sense for the beekeeper-entrepreneur by identifying the niche markets, often ignored, or are not cost effective for the large honey packers to enter.

So how does a small honey producer compete in a global economy? **First**, we step away from the idea that we need to compete in markets that shrink profitability. Head to head competition on price is a mistake for the small honey producer. We will lose against the high volume, more efficient commercial honey packers. **Second**, we need to recognize our strengths and those qualities unique to our local markets. One is that we have direct access to our customers. This understanding is perhaps the best advantage a small apiary has over larger businesses. You 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. A satisfied customer is the best advertisement that money cannot buy.

Consumers are changing their view of food. How we treat our bees, produce honey, its nutritional quality, and who produces it have become as important as the price. Reports of food contamination, including honey, the widespread use of additives linked to health concerns, and processing that degrades our food's nutritional value, have encouraged consumers to buy more locally produced food. This trend is more than simply buying from a local farmer or beekeeper. It has appeal to a growing number of environmentally sensitive customers willing to support sources of natural ingredients. They can meet the producer, support farming practices that are environmentally sustainable, and this shared philosophy adds value to a jar of local honey. Protecting land and open space becomes part of the benefit that each purchase adds to keeping a farm in business. Food consumption is a necessity, a personal choice, and it is increasingly a relationship between the local honey producer, the farmer and the customer. Customers need to understand how bees are managed, and honey is harvested. By educating your customers, you earn their trust and they become a loyal customer.

Remember the old joke "A farmer complained he was losing money on every bushel of corn he sold. Next season he would make up his losses by selling more bushels."

Markets

The markets you sell your products in must match your honey production and allow for higher wholesale prices. Each has its own set of rules and expectations. The best markets attract customers willing to pay more for quality, locally produced honey, and they see other indirect benefits associated with the products they buy. Which markets you enter are pre-determined by the quantity of honey you can produce.

When our honey production reached a level beyond what we could sell directly to our customers, we began expanding into larger stores. We had built a loyal customer base and had a local reputation for selling quality honey. Bonita and I were new to sales, but we had confidence in our products. After all, our customers told us how great it was and that it was worth the price. As we knocked on doors, our early efforts to get into larger stores were unsuccessful. The reason was that our wholesale prices were too high. Store managers would explain that after they marked up the price, no one would buy it. The larger grocery stores set the price they are willing to pay, and you are expected to meet the price or they do not buy.

Other requirements included delivery to a distribution center in another state, even though the stores where our honey was intended to be sold were within 10 miles of our apiary. There were additional fees for warehousing, wrapping with plastic film on pallets, and for inventory setup. Payments would be delayed 60 to 90 days after our delivery. This business relationship was not a good match for a small apiary. We were discouraged by the fact that much of what we valued and were doing had little or no value to the buyers representing stores. Large businesses like buying from other large businesses.

We had honey to sell, so we began to look at smaller stores that had local support and were mostly family or locally owned. Selling to a local business is a completely different experience. Price counts but the owners were willing to try our honey. Many had heard about us from their customers and knew we had local brand recognition. They were willing to pay our price, add their profit margin, and when it sold, they would increase their order. We could be flexible by delivering honey as needed, saving a small store the cost of keeping a large inventory that tied up their cash. We could promote our honeys with store tastings, and by sending our customers to stores closer to home saving some of them a longer drive to the apiary. Many buyers were willing to pickup from our apiary saving us time, and the cost of delivery. This was a comfortable fit and more than simply a business transaction. We are partners with a common goal. Both of us need to run profitable businesses and share some dependency on each other's success. Today we receive more calls from stores than we can supply. Those managers that took a chance on us 10 years ago remain our customers. We no longer look for outlets to sell honey as most of the businesses we supply continue to increase their sales. We have raised our prices several times over the years and there is never a problem with the buyers as we have maintained strong relationships in our business community.

The second lesson I learned about selling in stores is that the placement of your honey matters to your customers. When your honey appears in a store, it takes on some of that stores identity. For example a large store that appeals to customers looking for low priced honey, the convenience of one stop shopping, and food that is not always the freshest may not be the best venue to find customers willing to pay extra for a premium honey. Buying on price is fine, and blended honey that is heated and filtered does have a more consistent look and taste. Most brands of food have a predictable taste and that has appeal to customers. Others prefer freshness, variety in taste, and the lack of processing that can ruin your product. Honey lovers want a minimally processed, tasty honey, from local beekeepers. They know you rarely find this product in large grocery chains, or discount stores. Having your label on the shelf can lessen your image with the "buy local" customer.

Farmers Markets, Natural Food Stores, Specialty Food stores, Food Cooperatives and family businesses are where honey lovers buy honey. These markets have a different image and attract customers demanding fresh, locally produced products. Local honey is a required product in these markets. Honey on these shelves is from the local beekeeper, full of flavor, and true to the flowers and nectar of the region.

How about competition with other local beekeepers? Another marketing truth is that selling in a store with a dozen different honey brands can increase the number of jars you sell. Atkins Farms is a well-known regional market in our area. They have a reputation for buying quality produce and products from local farms. Paul the buyer loves honey and he displays an impressive variety of honeys from the New England region. I was reluctant to sell to him, as I did not think our honey would sell with so many other premium honeys on the shelves. I sold Paul a few cases at a higher case price then he was used to paying. That was ten years ago, now we sell plenty of honey. The reason is that Atkins Farms has a reputation for the best selection of varietal honeys and that attracts honey customers. The conclusion is that a quality product will sell regardless of the price, or the competition, when sold in a store known for carrying the best honeys. This is where honey customers buy honey. Paul now complains that the other beekeepers have caught up to my case prices. I usually respond

by saying it must be time for a price increase.

Markets for honey fall into three general categories for the small apiary. All have advantages and some disadvantages. The profit the beekeeper keeps is determined by the rules and type of market. Direct sales involves the beekeeper selling directly to the customer. The beekeeper keeps the full value of the honey, but invests personal time to make the sale. Any new beekeeper should start with direct sales. It requires considerable interaction with customers and will hone your ability to answer questions, and retain those customers. Farmers markets, Fairs, Festivals, and selling from the apiary are examples of markets where the beekeeper can sell directly to customers. Web sales also fall into the direct sales category. A good website can expand your area of sales, and allow the beekeeper to charge full-price and recieve full-value for their product.

Selling bulk honey or wholesale by the case to other businesses allows the beekeeper to sell more honey than could be sold directly one jar at a time. This takes less time and increases the number of locations to sell your honey. You get your label in front of more potential customers, but the store or farm stand owner takes some of the profit for making the sale. Grocery Stores, Farm Stands, CSAs, Food Cooperatives and specialty foods stores are very good markets for honey.

When selling to another business remember they need to mark up the product and make something on the sale. I find food stores markup 28-45% over the wholesale price, Farm Stands 30%, Coops and CSAs 20-25%. Specialty shops may double your price. The bottom line, make certain your prices cover your costs and leave some profit for the business owner.

Selling to Schools, Colleges and Universities is a growing market for larger producers. Institutional sales spread your profit over a higher volume (pounds of honey). As an example you might deliver fifteen cases of five-pound jars to the college warehouse. One delivery saves time and lowers the distribution cost. You can charge a lower profit on the total sale. To make a profit you must sell in larger amounts to make it worthwhile. Schools are seasonal and we do little business during the Summer when they are not in full operation.

Warm Colors currently supplies honey to Amherst College, Mount Holyoke College and the University of Massachusetts. They buy in quantity, pay within two weeks of delivery, and they provide us with considerable positive publicity to students, parents and faculty. Bonita and I attend events to support their commitment to buying from local farms. The University of Massachusetts was honored last year for spending 25% of their food budget purchasing from local farms, and yes, apiaries. Expect to shave your profit per pound to about 15 - 20%. In this market you compete on price and brand recognition. You will be expected to help the schools promote their image by attending harvest dinners and presenting talks to student and faculty groups.

We have started a recycling program for our glass jars (one dollar credit for each cleaned jar returned), we talk to science classes, host entomology classes at our apiary, and promote farm-to-school nights in the dining halls and on parent weekends. Any gap in price is quickly forgotten when you support and tell the story of how the University has put community ahead of costs and buying fresh food for their students keeps local farms in business.

The amount of honey you produce does determine which of these markets you choose, and if expanding into them makes sense. Direct sales are best for smaller apiaries as you can receive the maximum return on a limited supply of honey. Bulk and wholesale markets work for apiaries managing a hundred or more colonies, where enough honey is produced to sell direct, and supply a few stores throughout the year. The Institutional markets are for larger apiaries with 300 or more colonies. We sell to all these markets. At this time we sell about a third of our honey in each type of market. This has helped us sustain a consistent income throughout the year.

Regardless of how you sell your honey the total income is dependent on the size of your apiary. As we expanded our colonies and apiary locations we were increasingly challenged to keep up with the beekeeping and still make direct sales. Slowly we have been able to reduce the time dedicated to selling by changing our strategy to increase wholesale and institutional markets. This reclaimed time for the apiary work. As a result we have been able to produce more honey. There is an optimum size for a owner operated beekeeping business.

Next month, managing growth and increasing revenue. BC

Update, Burr Comb, And Breeding Lines

Larry **Connor**

It's Not As Complicated As It Seems

I write this at the middle of June and I just checked the electronic version of the July *Bee Culture* and boy, it is sure nice to have the fast turn-around that offers me (The e version is released about two weeks before the printed copy), since I can keep current in the real-time world as I work bees and write about it.

In that article I discuss the conversion board and the use of the Doolittle method of making new colonies. That was done in mid-May, one month ago.

The basswood flow is about done, but the sumac and sweet clovers are going strong. The spotted knapweed is a few days away from flowering. There is new honey in all the hives.

The new nuc

Let's start with the new colony, or the new nuc made in mid May. I made it up with one frame of brood, two to three frames of bees, and a frame of pollen and honey. I installed a virgin queen grafted from an instrumentally inseminated Carniolan breeder queen (Tom and Suki Glenn apiary in California). The bees were shaken off the frames at the entrance and the nurse and other bees walked back into the hive, through the hive bodies and through the excluder to cover the brood. The next day I moved the frames to a new location next to the parent hive. Doolittle used this system in his out-apiary as a way to make new colonies and keeping them in the same location. (His *A Year in the Out-Apiary* was published by Root in 1908 and is based on his beekeeping year of 1905.)

A little over a month after I installed a virgin queen into the new nucleus colony (new nuc) the queen had produced 4+ frames of brood, two like this, and was doing a wonderful job. I personally think this is why so many people keep bees, taking a small group of bees, a new queen, and turning them into a booming colony.

Now, just a month later, I am pretty excited about what I found. First, the virgin queen successfully mated and has generated solid brood on four frames of the five in the polystyrene hive. There are eggs in the center of the fifth frame, the food frame. The queen laid eggs corner to corner, and I fished out the iPhone to take the photo of the brood. The queen still has the yellow mark on her thorax that I gave her BEFORE I put her into the introduction cage. She was held in the nucleus for several days and then the plastic cap was removed. This allowed the bees to liberate her, not me. The marked empty cage is still in the nucleus as my record of what I did. There are already new worker bees emerging (because the queen was a virgin, we gained a few days on the mating schedule), and a few days later I moved the nucleus into an eight frame hive body. I could just as easily have split the nucleus, with the new part getting another virgin. Instead I removed one frame of emerging brood to boost another nucleus colony.

Last year's nuc

This is the colony that gave up the new nuc. It is now in three deep 8-frame hive bodies, with pretty good brood strength in the first two boxes, and honey storage on half of the frames in the third box. This is in June, when many nectar flows often start in this region. The weather forecast is for hot days and clear skies, so we should have good nectar as the clovers, sumac and star thistle bloom.

The colony was overwintered in the same polystyrene hive as the new nuc is now in, and grew rapidly over the late Winter and early Spring. It has been a very early Spring and as I write this, Summer is still days away! Here is a summary of what this colony has done:

August to March

Five-frame overwintered nucleus with summer of 2011 mated Carniolan queen

April

Colony moved to eight-frame single box

Late April

Colony given a second eight-frame box

Early May

Swarmed, no queen found but two frames of old brood still present. One brood frame was used to make the new nuc.

Mid June

The replacement queen (grand daughter of the II breeder queen) has brood in two deep eight-frame

boxes and has taken off. Because this queen is the granddaughter of an II breeder, all her drones are Carniolan (see below), and are useful to boosting the genetics of the area's bee genetics. This is one of the great unappreciated features and benefits of a bee breeding program using instrumentally inseminated queens! The mother queen that swarmed.

One of our own queens, grafted from Tom Glenn's Carniolan instrumentally inseminated breeder. We mark the virgin queens prior to mating, making sure the queen in the nuc is the one we installed. This does not seem to interfere with mating. This year the dragonflies are taking a toll on bee matings everywhere.

Another new nuc

Because this overwintered colony is doing so well, I made up a second new nuc, removing two frames of brood and a frame of food this time. I will place this hive in the area on my city lot behind the garage. This cycle could be repeated in July and August. I am not sure I want six colonies behind the garage, but using the conversion board and the nucleus, it sure is easy to make up a new colony. I never even needed to find the queen, which is a huge advantage for less experienced beekeepers and on those times when the most experienced beekeeper cannot find a single insect in a box of tens of thousands, or lacks the time to look!

The package hive

The last hive in the bee yard is a three pound package of bees from California, sold to me as Carniolan. The colony was installed in late April and now is actively filling the second eight-frame deep with new brood and new honey. It has nothing to build on but black plastic comb because there are no more drawn frames anywhere in all my colonies and nucs. (Many are filled with honey that will be given to new nucs as needed for extra food reserves and build up for winter.)

I am not comfortable making a new nuc from the package hive, at least not yet. It has only been six or seven weeks since the bees were installed. If I had purchased new queens for mid-June delivery, I certainly could remove a frame of brood and bees and a frame of honey and pollen, and use it to set up the colony.

Instead I plan to remove a nuc from this colony when I return from several weeks of travel, sometime in mid July. That will give the colony plenty of time to buildup and Winter as a five-frame colony. The package colony will give up these frames of brood that will be supplemented with a frame of bees, pollen and honey from another hive to produce another new nuc! Leaving most of the adult bees in the package hive lets the them build for the Winter, which as far as I am concerned, is it's job this year.

Growth and Treatments

Should the season's weather and plant growth continue to be as favorable as it has been I hope to take one overwintered nucleus and one package of bees and build them into strong hives by late Summer. They will have all the food and drawn comb they need for successful wintering. They will need to be sampled for *Varroa* mite populations and treated with powdered sugar or another mite treatment. *Varroa* is what seems to kill these colonies during winter at my latitude – one Ontario survey shows that nearly 90% of the colonies that die during the winter die due to factors linked to *Varroa* mites. We are at the same latitude, so mite control is huge.

I am reluctant to use chemicals unless forced into it. If possible the colonies will be sampled (powdered sugar roll does not kill bees and gives good results), and if the mite counts are high I will treat the colonies with powdered sugar twice a week for four weeks. This will expose all the mites in the colony to powdered sugar for over two sealed brood cycles (12 days for worker brood). The goal is to hit the colonies hard with the powdered sugar and reduce mite loads to an acceptable level for Fall feeding and Winter preparations. Should that fail, a treatment with a low-impact miticide will be selected and used.

Now with two nuclei, it seems logical that I could produce three or four more, using the Doolittle method. Generating six nucs for wintering will require good pollen and nectar forage, a good supply of virgin or mated queens, and all the equipment needed. My first new nuc could be split or allowed to grow. One of the amazing aspects of beekeeping is the tremendous reproductive rate of really good colonies with the essential combination of right-aged bees and a vigorous queen

New queens don't swarm

Maybe you were taught that new queens, those less than one year old, do not swarm. Sounds pretty familiar to me. This season my overwintered nuc, and my overwintered colonies (including many at the farm) have disproved this concept. Early hot weather alternated with cool spells to stimulate five frame nucs to swarm. If you left your hive untouched because you believed 'new queen don't swarm' well, they probably did. Like mine.

My queens all have marks on them, yellow for 2012. We keep waiting for someone to catch a swarm or do a cutout with a marked queen heading the colony.

Predicting bee behavior requires some experience and a strong stomach for the unexpected.

Burr comb and small hive beetles

The warm weather opens the flood gates for small hive beetles and wax moths. Both favor the warm,

We emerge virgins in wood and screen cages, mark them and then transfer them to JZsBZs plastic cages, with queen candy in the tube. So far we seem to have good success with virgins, especially under 14 days of age (post emergence).

humid Summer and Fall days and will explode in populations. With the small hive beetles, I want to share an observation made to me when I visited Hawaii. There the beekeepers were fighting a huge load of beetles. They found that it was very important that all colonies NOT have combs that touched, either each other inside the hive or the bottoms and sides of the combs. This is a pretty good reason to keep the combs trimmed of all burr comb (also called ladder comb as the bees have a continuous link from frame to frame as they climb the comb to the honey storage supers). As I close a hive, or reposition a brood comb or honey super I now check to make sure that every frame is evenly spaced, and I use the hive tool to push the combs toward the center, leaving a bee space along the sides of the box. This also is better for ventilation I am told.

Whereever combs touch each other or the sides of the hive, the female beetles are able to deposit a large mass of eggs that hatch in two days *where worker bees connot reach.* Colonies with some marginal conditions – poor strength, queenless, or even going through natural queen replacement (supersedure) – will not be able to overwhelm this mass of evasive larvae and the colony will be slimed in a matter of a few days. Since I observed overwintered beetle adults in the Winter clusters of bees this past Winter, I know the beetles are here, and waiting for me to make a stupid mistake. Pushing fat combs of honey together is one of those mistakes. It would be costly if it cost me my hive.

Drones from daughter queens

Because diploid queens produce unfertilized haploid sons, these male bees possess only the genetics of that queen, which comes from the queen's mother and single drone father that fertilized the queen's mother's egg. If it seems complicated, I first learned it this way: A drone has no father, but has a grandfather.

When you purchase a queen from a breeder that is naturally mated, she will provide genetically true drones while she is alive, and also when her daughters are alive. This means you can purchase a naturally mated queen and generate daughters from her that will provide drones for mating in a mating plan, or just for kicks. A simple family tree from my Starline days would look like this. (GH is the queen line and AeF is the drone line. Ra is a random or wild type drone, one you expect to find in nature. NM = Natural Mating, II = Instrumental Insemination).

In the first example we are grafting from a GH breeder queen and naturally mating her daughters to Random drones:

Natural Mating:	**Workers**	**Drones**
NM Mother	GH x Ra	pure GH
NM Daughter	GHRa x Ra	pure GH
NM Grand daughter	GHRaRa x Ra	half GH

But when you purchase a queen from a bee breeder that produced the breeder by instrumental insemination, you have an additional generation of genetic fidelity in the drones. Here, two lines of queens, not related to prevent inbreeding, are mated in the lab to eliminate random drones. It looks like this:

Instrumental Insemination:	**Workers**	**Drones**
II Mother	GH x AeF	pure GH
NM Daughter	GHAeF	pure GH
NM Grand daughter	GHAeF x Random	pure GHAeF

Because the initial instrumental insemination used two quality lines and the mating was controlled, you have drones that are identical to their aunt workers of the previous generation. In the example mentioned above, my granddaughter Carniolan colony (workers half Carniolan) produces drones representing both sides of the controlled mating, and are thus pure Carniolan.

This has a huge impact on the potential for bee breeding and integrating quality characteristics into a gene pool at a very reasonable cost to the beekeeper. BC

A queen rearing class will be offered by Dr. Connor in Galesburg Michigan on August 24-26. For further information consult ***www.wicwas.com*** *or* ***LJConnor@aol.com****.*

What's The Buzz About?

There's many differences between wasps and bees. Here's good ways to help others understand.

Jennifer **Berry**

Humans often associate the "buzzing" of insects with that of a bee: Why not a wasp, or a June bug, or a robber fly . . . Nope, only a bee! More often than not when any airborne insect is out buzzing about, people identify it as a bee. Why is this? Perhaps our early teachings that cows go moo, pigs go oink, and bees go buzzzzzzz are to blame. If so, then maybe these early teachings should also include that a flying cockroach or a long horned beetle goes buzzzzzzz as well. Ok, maybe that's going a bit too far (though they do buzzzzzzz). Alternatively, perhaps this auto-assumption initiates deep within our subconscious, a likely result from the years of the media's relentless pairing of words like "bee" and "buzz"? As a child one of my favorite breakfast foods was Honey Nut Cheerios. I'll never forget the image found in every commercial and on every box of this tasty breakfast treat – a friendly fun-loving bee named "buzz." I wonder if this insulted Mr. Aldrin?

The general public commonly associates 'buzzing' with 'bees,' 'bees' with 'stinging,' and 'stinging' with 'pain.' Therefore, it seems only logical that they might also associate bees with pain. This explains why, when you're relaxing on a blanket in the park with friends or family, all of a sudden, buzzzzzzz, that noise rings in your ears and simultaneously a neuron fires in your brain communicating that a **bee** is in the vicinity. The potential for physical harm causes fear to ooze from your brain, overtaking your ability for rational thought, so naturally you stand-up and take off running, swatting the air wildly until you reach the safety of your car or until your energy gives out. Apiophobia, the *irrational* fear of bees, doesn't seem *so irrational*, huh?

Bees in general, though honey bees especially, have been given a bad rap. I guess it's the lack of knowledge about all the other stinging "bugs" scampering about this planet. But during the Summer month's, the reputation of bees is especially susceptible to slander. Hot, dry spells, like we usually experience from June to October here in Georgia, lend to very few blooming plants and shrinking water holes. Therefore, foragers of all kinds are attracted to just about anything sweet and watery. There tends to be large amounts of sugary beverages consumed in the Summer, and the remains are tossed in trash cans scattered about in parks and other public areas. The syrupy substance found in these partially consumed beverages attracts not only ants but also wasps, yellow jackets, and occasionally honey bees.

Calls usually start around July 1st. People upset that their hummingbird feeders are covered in bees, or that they can't enjoy the picnic areas because of all the bees flying around the trashcans – *all* of which are scaring the children. My initial response is to calm the distressed caller, and convince them to put down the can of Raid, and then try to get an idea of what is actually happening. Usually, the "killer bees" that are causing such havoc, aren't bees at all but instead, those annoying little creatures we call yellow jackets. Not to be confused with the other pesky critters associated with Georgia Tech, (sorry, state rival). And yes, admittedly, bees resemble wasps, which the general public apparently doesn't care enough to find out that there is a difference.

While doing some research for an Africanized bee presentation, I came across the cover art for a movie titled "Killer Bees". There were three different images, with the same insect, all of which were not bees, but wasps. You would think the artist would have at least researched this a little better, considering it was the cover art for a movie.

Another example, Dr. Delaplane was being interviewed by Bill O'Reilly several years ago. Apparently there was a stinging incident at a park, where a group of school children were "attacked" by yellow jackets. Why this made national news, I don't know. Anyway, they contacted ⇨

Red wasp.

Wasp.

Dr. Delaplane and he was rushed to Atlanta to be interviewed about bees. During the show, while reference was being made to bees, not wasps, they continued to run stock footage of wasps. ARGHHHHHHHH!!!!! So there you have it; to most folks, wasps are bees, hornets are bees, all stinging things are bees.

Differences between bees and wasps: Part I

Living things are classified into groups depending on their similarities or relatedness. The animal kingdom is divided into a number of phyla (singular *phylum*) with each phyla divided into classes, classes into orders, orders into families, families into genera (singular *genus*), and genera into species. Bees, wasps, sawflies and ants belong to the **Phylum**, *Arthropoda*; **Class**, *Hexapoda* (Insecta); and order **Hymenoptera**, which is one of the largest orders of insects consisting of over 130,000 species. Other than *Isoptera*, the order to which termites belong, *Hymenoptera* is the only other order to have evolved complex social systems with a division of labor. This order is by far the most beneficial to mankind because it contains not only the pollinators of plants (bees) but parasites and predators of insect pests. But what put them together in the same order to begin with?

Bees, wasps and alates (winged reproductive ants) have two pairs of wings, as opposed to flies which have only a single pair of wings. These wings contain hamuli, tiny hooks in a row that connect the forewing to the hindwing during flight. All members have chewing mouthparts, mandibles, and antennae with usually 10 or more segments. The stinger is a modified ovipositor, hence only the females can sting, and is used for defense and offense. Metamorphosis is complete with the larvae being grublike and pupae formed in a cocoon. Fertilized eggs develop into females, whereas unfertilized eggs usually develop into males. Behaviorally they are categorized into parasitoid, social and solitary.

Even though bees and wasps belong to the same order and share many morphological/behavioral characteristics, there are equally as many (if not more) key differences which separate them. Some of the more obvious physical differences – bees are usually hairy, with robust bodies, while wasps tend to be more slender with shiny, smooth, exteriors. Additionally, wasps have a narrow "waist" connecting the thorax to the abdomen whereas bees look as if the two are fused. The legs of each insect differ as well. Wasp legs are more long and cylindrical (better to catch its prey with) where a bee's legs are stouter and flattened, especially the back legs. Why the difference in body types? Well it's all about what they eat.

Bees are technically vegans since they consume absolutely no animal products. No cheese, no milk, no eggs, not even yogurt infused with honey. Pollen and nectar are their sole food sources. Pollen supplies the protein, minerals, amino acids, vitamins and everything else except the carbohydrates, which come from the nectar. Stepping back a moment, actually more like 96 million years, angiosperms, or the flowering plants, co-evolved with bees. Flowers, with their brightly colored petals and enticing nectar depend on bees and other pollinators to distribute their pollen to other like-minded flowers, while bees depend on the pollen and nectar for food. I guess it is fair to say that both would not survive without the other. So which came first, the pollen or the pollinator? Ok, that's a whole different story and a long standing debate; back to why bees are fuzzy.

Bees must visit numerous flowers in order to collect enough pollen to feed their baby sisters back at the hive. As a result they have evolved stout, hairy bodies to which the tiny pollen grains adhere to. Pollen covered bees begin to "wipe" themselves clean of the pollen that has collected on their head, body and forelegs. The pollen is moistened with nectar during this process and moved to a specialized structure called the pollen basket or for you master beekeepers, the corbicula. Located on the hind legs, it's a slightly concaved section surrounded by spiky hairs which helps to hold the pollen in place. Over time, the collected pollen forms a sphere. There are other bees with such structures – bumble bees, stingless bees, sweat bees and orchid bees to name a few. It's always an exciting moment to witness a season's first load of pollen being brought in because you know that spring is just around the corner.

Wasps on the other hand are omnivores, meaning they eat both plant and animal food – first like us. But they are predominately carnivorous, and they eat mostly insects. Depending on how they collect their food and whether or not they share it, determines how wasps are categorized. There are three arenas – parasitoid, solitary hunter, or social – to which wasps may belong. Bees on the other hand are categorized as either social or solitary. We will explore the complicated "social" world of both bees and wasps in Part II. For now lets begin with the first two arenas in which wasps are grouped.

Parasitoid wasps, which range in size and color, can be a gardener's best friend. However, unless you are looking for them, they probably go completely unnoticed, as most of them are quite tiny. These particular wasps lay an egg or eggs inside or on the surface of their prey. These eggs hatch into larvae and consume the parasitized insect from the inside out or outside in. Not the most lovely mental image but, if you have numerous, fat, hornworms devouring the leaves on your tomato plant, or aphids sucking out precious nutrients, then I imagine you would

welcome these wasps to your garden to wreak havoc upon these pests, no matter how cruel. Having these wasps in the vicinity also keeps one from having to expose yourself and your garden to toxic and expensive insecticides.

Parasitoid wasps are usually host-species specific. For instance, the small braconid wasp, *Cotesia congregata*, only preys on tomato hornworms, and the tiny *Encarsia formosa* only whiteflies. This superfamily of wasps are viewed as beneficial since they control a whole array of agricultural pests – aphids, whiteflies, beetles, flies, scales, caterpillars and true bugs. For instance, when an aphid has been parasitized it becomes motionless, stops eating and eventually turns brown and appears swollen. These are called aphid mummies. If you look closely you may eventually see a hole appear in the abdomen where the adult wasp has chewed its way out.

Another type of wasp are the solitary hunters. These wasps hunt for a particular prey, sting it in order to paralyze it, then transports it home and stuffs it into a nest. The nest may be a hole in the ground, or a tube made out of mud, or a hollowed out plant. Once the nest is constructed and the nest provisioned with enough food, the wasp will lay an egg and seal the nest. The larva eventually emerges and consumes the food its mother has provided. These solitary hunters include many of the more common wasp species. Mud daubers, which love to construct tubes of mud along side your home, under eaves, inside your garage or bee equipment, are one example of this large group. If you've ever broken open a nest, then you may have seen either a half consumed spider or perhaps a very lethargic, motionless spider.

This particular category also contains one of the scariest looking wasps out there, the Cigar Wasp, often called the Cicada Killer. This wasp is roughly two inches long with a thick yellow and black body. Not only are they big, but when one flies by you it sounds like a helicopter. However, they are gentle giants, maybe not to cicadas. You practically have to force them to sting. They are not aggressive and fun to watch. They dig a hole in the ground, fly off in search of their prey and return and stuff the paralyzed cicada into the hole.

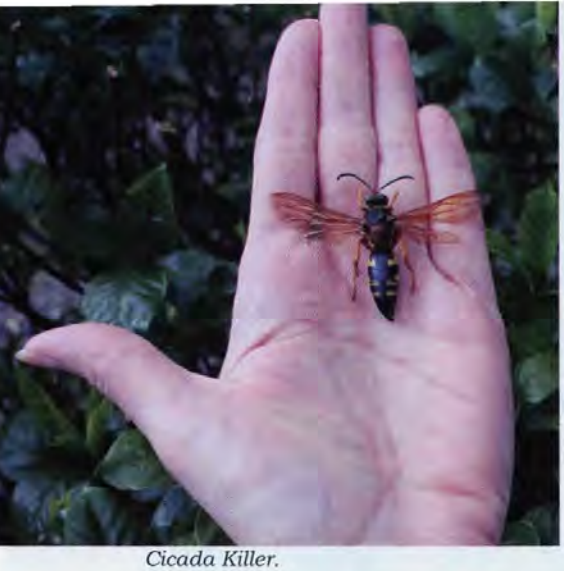
Carpenter bee.

Years ago we got a call here at the lab from a "terrified" women telling me how her yard had been invaded with these large, pterodactyl looking "bees" that would not allow her or her children to exit their home. "Please come save them", she whimpered. When I arrived on the scene there were 20 or so cicada killers flying around in their backyard. They had found the perfect nesting ground: sandy, loam soil, on a slight incline. As I approached the nesting location, it was a bit intimidating to have these large wasps flying around my head, but I quickly realized they were apathetic to my presence in their territory. Actually, one landed on my arm, just taking a breather I guess. The lady and her children's faces were pressed up against the window, with mouths agape as they watched me put one of the wasps in my hand. They couldn't believe I was actually in the midst of these killer "bees" and not writhing in pain from all the stings I was receiving. After much persuasion, I was able to lure the children out into the yard to see these fascinating wasps, but mom continued to refuse. Once the initial fear had dissipated, the kids loved observing these creatures up close and personal. They even saw one wasp fly in with a cicada and spend about 10 minutes trying to stuff it, pull it, drag it down the hole that had been excavated earlier.

Another very common solitary wasp is the velvet ant, aka, cow killer. These furry, brightly colored, mostly red to orange, wingless, female wasps resemble large ants. You will notice them running along in search of the immature stages of ground nesting bees. The female will enter the nest and lay an egg. The immature wasp larvae are external parasites on the developing bees. But don't be fooled by their "ant" like appearance. These wasps can deliver a painful sting if threatened.

As mentioned before, bees are grouped into two camps, social and solitary. Solitary bees, as the name implies, work on their own to raise their young and are valuable pollinators. They make a nest either by taking over one that already exists, digging burrows in the ground, or excavating nests in wood or plants. Digger bees, sweat bees, orchard mason bees, and carpenter bees are some examples of solitary bees. In this group, all females are fertile and provision their nest with food for the developing brood. These bees are rarely aggressive and if provoked their sting is very mild. Folks that usually do get stung are popped while working in the yard by a very common but tiny (4-10 mm) bee, the sweat bee. Sweat bees, as the name implies, are attracted to salt from human perspiration. They usually sting when trapped between folds of skin or aggressively handled. These beautifully marked or colored bees (metallic gold, blue, or green) can be observed wherever flowers are blooming.

Carpenter bees are probably the most annoying of all the bee species. First off, females excavate holes in the wood-boards around our homes, barns, garages, and sheds. These 'galleries' are the nesting sites for future generations. Even though they are considered to be pests, they do pollinate open-faced flowers, though they struggle with flowers with narrow,



Cicada Killer.

deep corollas, like, blueberry flowers. So, they've figured out a creative way they get around this by biting the side of the flower at the base, exposing the nectaries, and then extract the sweet substance they secrete. If you have carpenter bees in your area, check the base of your flowers and you may see these slits.

The males, which have yellow dots on their foreheads, are also a bit intimidating. During the early spring months, they become very territorial and will hover in the air just waiting for anything to come close. If something does enter the zone, they swoop down and make several passes around the intruder, sometimes even making physical contact. They will also fight tooth and nail with other males to protect their nesting site. But don't be afraid, these males, like all males in the Hymenopteran order, have no stinger and therefore can not inject a painful sting. But they can be somewhat annoying.

Speaking of stings, honey bees and wasps are different in this arena as well. When a wasp stings its victim it doesn't die, and can sting multiple times, which makes for a bad day when one stumbles into a yellow jacket or bald face hornet's nest. When a honey bee stings she will die and it all has to do with the stinger. Honey bees are unique since they are the only member of Hymenoptera that carries a barbed stinger. Once the stinger embeds into the skin and the bee flies away she leaves behind the sting, the venom sac and the muscles that pump venom and push the sting further into the skin. Because of this physical insult she will die, but she seldom dies in vain.

I've yet to mention one of the biggest differences between bees and wasps; wasps don't make the honey that goes on my biscuits or in my tea. We'll continue next time with more morphological differences and the complex world of sociality in Part II.

See Ya! BC

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

Honey Bee SCOUTING

The Next Extreme Sport?

Chelsey **Coombs**

Food scouts and nest scouts are the novelty seekers in a beehive.

Each year at the Summer X-Games, extreme sports athletes congregate in Los Angeles to perform death-defying stunts on skateboards, BMX bikes and motocross motorcycles, while most people watching at home are happy *not* to be doing aerials in the half-pipe on a skateboard. Although they probably aren't as interested in extreme sports as humans are, a new study published in *Science*[1] reports that honey bees are just as diverse when it comes to seeking out new situations.

Novelty-seeking behaviors are those related to the exploration of a new environment or situation. Previously, these behaviors were studied in humans by Bardo et al. (1996)[2] who showed that high novelty seekers are more likely to use drugs than low novelty-seekers. In a more positive context, human novelty seekers often have eyes for discovery and conjure up ideas for the newest technology or are daring enough to participate in extreme sports.

Grad student Zhengzheng Liang. (Carr-Markell photo)

In honey bees, novelty seeking is exhibited by two types of bees, food scouts and nest scouts (Seeley, 2010)[3]. Food scouts make up five to 25 percent of foragers, the bees that gather pollen and nectar for the colony. These adventurous bees will search for new food sources even when there are good sources available. Nest scouts make up less than five percent of the population of a swarm, or a part of a colony that has left the original nest to begin a new colony; these scouts search for new places for the colony to live.

In contrast, non-scouts rely on the information communicated by the scouts via dance language to guide their foraging and nesting behaviors, a behavior more indicative of a "leader and follower" situation. Scouting behaviors are essential to the survival of the colony due to the ephemeral nature of food sources and the importance of a well-protected living space.

A major goal in the field of behavioral biology is to link the behavioral differences of individuals to molecular differences within individuals. The differences between scouts and non-scouts in the honey bee colony offer a new context for studies in this field.

Illinois Neuroscience Program graduate student Zhengzheng Liang and her advisor, Institute for Genomic Biology director and entomology professor Dr. Gene Robinson, worked with colleagues at the Wellesley College Department of Biological Sciences and the Cornell University Department of Neurobiology and Behavior in order to explore the behavior and molecular mechanisms underlying the novelty-seeking of honey bees.

Two behavioral assays were used

The enclosure and feeder. (Liang photo)

That first scout arrives at the feeder. (Liang photo)

Later, hundreds follw her lead. (Liang photo)

to determine the scouting nature of individual bees. Because there is little known about novelty seeking in bees, the team had to come up with a paradigm to find out which bees were seeking novelty and which were seeking consistency.

The first assay the researchers used was a modified version of the standard "hive moving" assay, first developed by Dr. Martin Lindauer, a former student of the legendary Karl von Frisch, and himself a very prominent bee researcher in his own right. They identified those bees in a swarm that visited potential new nest sites. They marked these nest scouts and put the whole swarm into a hive. At night, when the bees do not forage, the researchers moved the hive to a new location. The first bees to return to the hive the next morning were judged to be food scouts, the bees that are willing to explore unfamiliar surroundings in search of food sources.

On average, the nest scouts were over three times more likely to also be food scouts than those that did not show nest scouting behavior. These results reveal that even in varied behavioral contexts, certain bees show a tendency toward novelty seeking, a personality trait that could be paralleled to human novelty seekers that enjoy a variety of extreme sports.

In a second experiment, researchers placed an observation hive in an outdoor enclosure so food sources could be experimentally controlled. At first, a training feeder provided the only food source. After two to three days, however, a new feeder with different odor and visual cues was placed in another part of the enclosure, giving the bees two choices of food sources. The bees that switched to two or more feeders after visiting the first feeder at least once were considered to be food scouts. These identified bees were collected for molecular analysis.

The team dissected the brains of the collected food scouts and non-scouts, then utilized whole-genome "microarray" analysis, which measures the expression of large numbers of genes at the same time, to determine whether there is a unique molecular signature in the brains of bees that exhibit scouting behavior. In fact, 16 percent of the genes expressed in the brains of foraging bees were expressed at different levels between scouts and non-scouts. Some of these genes are related to those known to regulate vertebrate novelty and reward seeking, as well as individual human personality differences in novelty seeking.

Further experiments determined that there were distinct brain expression profiles for scouts and non-scouts for these genes.

The researchers then wanted to find out whether novelty-seeking behaviors could be induced in non-scouts using neurochemical treatments based on the gene expression profiles. They placed 20 non-scouts in various cages within the hive and gave the bees an oral neurochemical treatment for 25 to 30 hours. Again, they moved the hive at night to a location outside of the bees' home range, and the first bees to return the next morning were deemed food scouts. Exposure to the nerve cell messenger glutamate increased scouting behavior, while a drug that blocks glutamate reversed the effect. Similar effects were obtained with another nerve cell messenger, dopamine, while a decrease in scouting was caused by exposure to octopamine.

"It was quite surprising because [the results] were telling us that maybe the molecular basis for bees seeking novelty is the same or similar to what humans have," Liang said.

She believes that the study "shows that bees may have a personality," and offers insight into the molecular underpinnings of their tendency to explore. The genetic and molecular components of novelty seeking behavior in honey bees are similar to those seen in humans, but are the result of a separate evolutionary pathway. This is interesting to note, as similar behaviors often emerge from similar molecular or genetic components, even if the organisms exhibiting the behaviors are evolutionarily unrelated.

Because it has been shown that novelty-seeking humans tend to have a higher risk of developing drug problems, Liang says that researchers could use bees as a model for studying drug addiction.

Who knows, the next bee that crosses your path could be the next gold medalist of the colony. BC

Acknowledgements

I thank Dr. Gene Robinson, Dr. Karen Kapheim and Diana Yates for comments that improved this manuscript.

Chelsey Coombs is in the Department of Entomology at University of IL at Urbana-Champaign.

References

1. Liang, Nguyen, Mattila, Rodriguez-Zas, Seeley, and Robinson. *Molecular determinants of scouting behavior in honey bees.* Science 335:6073, p1225-1228. 2012.
2. Bardo, Donohew, and Harrington. *Psychobiology of novelty seeking and drug seeking behavior.* Behavioural Brain Research 77:1-2, p23-43.1996.
3. Seeley, Thomas. *Honey Bee Democracy.* Princeton University Press, Princeton, NJ. p73-98. 2010.

Honey Bees & Parasitic Mites, Part 1

James E. **Tew**

A bit of a review and a few practical suggestions for suppressing Tracheal and Varroa populations.

You can actually "watch" this article

By the time you get this article in *Bee Culture* magazine, I will have posted a webinar version of it as part of The Ohio State University's beekeeping webinar program[1]. Other programs are already posted for your review. Editor Kim will also be part of this OSU series.

In all honesty . . .

Truthfully? I was reticent about taking on the topic of mite control as a presenter. Beekeepers and their mite control programs everywhere are in flux. We don't have the final solution to any mite concerns. What we do have are variables that are all over the apiary. High populations. Low populations. Strong colonies. Weak colonies. And queens, they are always an issue. There are variables in every part of this mite control issue. With your patience and experience in place, please hold on while I try to slog my way through this brief review of the two mites that presently frighten us the most.

You had to have been there

Beekeepers, such as I, are declining in numbers every day. We knew honey bees *before* mites. Indeed, I even knew honey bees hives before plastic. Even then, it was beekeeping, but it was *different* beekeeping.

In general, there were just more bees then – colonies in trees, colonies in buildings, more swarms, and fewer Winter kills. I suppose I make it sound heavenly. So here is the other side. There were other things that should also be remembered. We did not have as many beekeepers, and frames took forever to assemble with 1¼" nails. Wiring frames and installing foundation was a wintertime chore, and our communication system consisted mainly of this magazine and a few others. We actually wrote letters and paid for long-distance phone calls.

Oddly, I don't exactly want to go back there without some changes

I would like the best of both worlds. I would like my colonies now to behave as they did then. I want the big honey crops and the low winter losses. But I want my digital camera and my Internet-connected computer. I want to be able to put clips on YouTube, and I love having a filing cabinet that literally fits in my shirt pocket (a jump drive). Yes, things were good then but – yes – some things are good now in different ways.

Tracheal mites

Tracheal mites – the lesser of the mite demons – got to our bees first. As it were, we practiced on Tracheal mites while mentally bracing for the "main feature" – *Varroa* mites. Tracheal mites were identified in 1921. They were a familiar old pest from the Isle of Wight. The Isle of Wight is a county and the largest island in England, located in the English Channel.

In 1922, U.S. regulatory agencies restricted all imports of honey bees into this country. There is no one left now to give us a first-hand description of what a big deal that must have been for beekeepers and bee breeders. Until then, beekeepers before us traveled the world – looking for the best bees anywhere. There were no restrictions. "Bring them on in!" We are still longing for the perfect queen stock, but we no longer whimsically import untested stock. We are still paying for the mistakes we made in bringing in some of that stock.

Apparently, the ban worked. Researchers did not find this mite in U.S. bees until 1984, 62 years later. It is postulated by some that the mites made it to South America during the establishment of the Africanized honey bees. They were in Mexico by early 1980 and then they came into South Texas. Eric Mussen, University of California, Davis, estimates that Tracheal mites killed 50% of the bees in the U.S. and in later years, *Varroa* killed 50% of the remaining half.

Regulatory specialists across the southern tier of states vainly tried to stop the establishment of this new pest. We had no experience with this kind of thing. Quickly, it was decided that killing bee colonies was not a proper way to save other bee colonies. These mites were allowed to go wherever and do whatever.

They are small!

You will need a binocular dissecting microscope of at least 50X magnifications and a bit of skill to dissect bees while looking for Tracheal mites. Though not very

[1]For all captured webinars, see: http://beelab.osu.edu/t08_pageview/Workshops_and_Webinars.htm

Tracheal mites in the trachea (USDA photo).

difficult, it is a tedious process that requires the use of steady hands and confidence using the microscope. For those having an interest in this procedure, a thorough description is offed at the citation below[2].

Effects on bees

If populations become large enough within the bee's breathing tubes (trachea), they can impede oxygen uptake. The host bee is weakened by the feeding and probably viruses or other pathogens are transmitted by the feeding procedure.

Visual symptoms

Some general characteristics of a Tracheal mite infestation are:

1. Reduced brood area and brood production
2. Consequently, smaller adult bee populations
3. More poorly defined Winter clusters
4. Consequently, increased Winter honey consumption
5. Generally, lower honey yields (probably due to reduced adult population)
6. Bees crawling on the ground around the hive
7. K-winged bees (lethargic worker bees holding wings unattached on each side (Roughly looking somewhat like the letter "K".)
8. Empty hives in the Spring

The problem is that these eight symptoms are general descriptors and could be used to diagnose several other bee diseases, too. By the time you see the K-wings and the colony is weakened, it is essentially too late to do anything to save that colony.

What treatments are available?

At one time, these mites gave U.S. beekeeping a fit. They terrified beekeepers. You could not readily see them so it was easy to become superstitious. Apparently, they are only found on honey bees and are a reasonably well-adapted internal parasite. Maybe that helped.

Though initially frighteningly destructive, they waned within a few years. This infestation weakening could have been due to: (1) improved adaption between host and parasite, (2) *Varroa* treatments could have had a mitigating effect on Tracheal mites or (3) the massive interest in *Varroa* simply redirected attention from Tracheal to *Varroa*.

(Apparently) Tracheal mites are still out there. Two common control materials – menthol pellets and or grease patties – are not used much now[3].

Should you and I be using one (or both) of these materials?

Truthfully, I don't know. Though I did at one time, I presently don't use them. Maybe I should. The grease patties are easy to mix and seemingly benign, but it's just one more thing to do in and around my beehives. But I know that Tracheal mites have not gone completely away. They are still there – lurking – overshadowed by *Varroa* concerns. And this Spring, for about a week, I did have a specific example of 30-40 bees crawling away from one of my hives. Ultimately, I don't know how many bees crawled away. Another beekeeper was visiting, and we discussed the possibility of Acarine disease. Of course, it could have been pesticides or a virus. After a few days, it passed. It's never an easy call. I don't know what it was.

For the present, you should know that these mites are still around. If you don't have any of the general symptoms, don't fret over this pest. If you have colonies with some of the symptoms listed above, no harm done in putting grease patties on. At one time, this was a way of life for all U.S. beekeepers. Tracheal mites may be unseen, but they should not be forgotten.

And now, Varroa destructor – the honey bee pest that needs no introduction

Up to this point in our beekeeping history, *Varroa* predation is simply the biggest thing that has ever befallen our industry. No matter how new to beekeeping, everyone knows about this parasite. We staggered through the Tracheal mite invasion. Movies were made about Africanized honey bees. We marveled at the mystery of Colony Collapse Disorder (CCD); and recently, we have made pesticide companies vividly aware of our chemical concerns. Through it all – Varroa kept right on doing what it does best – killing our bees. They have proven themselves to be an admirable foe.

We knew they were coming

U.S. beekeepers knew *Varroa* was coming – sooner or later. Beekeepers of the day were novices and had supreme confidence in our apicultural science prowess. Much of the world had already been defeated by this new pest, but once they got here, we felt things would be different. Then as now, we had competent scientists. How could this defeat us?

Please remember that in 1987, the Internet information system was in its infancy. Most beekeepers were not even connected electronically. Generally, our information was traditional and spotty. *Varroa* was terrible or *Varroa* was not so bad. We may never get them or we will

[2] Sammataro, Diana. An easy dissection technique for finding the Tracheal mite (Acarapis woodi) in honey bees **http://goo.gl/HUd7U**

[3] Recipes for grease patties:
1 lb. vegetable shortening (such as Crisco®) , 2 lbs. granulated sugar or 1 lb. vegetable oil, 3 lbs. granulated (or powdered) sugar
From: https://agdev.anr.udel.edu/maarec/wp-content/uploads/2010/03/TRACHEAL.PDF

surely get them. Then as now, you could hear what you wanted to hear. Occasionally, a world traveler would bemoan what they had experienced in other *Varroa*-infested countries. Those who had not seen them would question the accuracy of the description being presented. Few of us had ever seen *Varroa* except in photos. What is now so commonplace was at that time so exotic.

Then they were here

Primarily, they were first found in Florida. I felt smug in Ohio, but I felt terrible for Alabama beekeepers. I must have thought that some control methods would be worked out in these newly infested states. I don't remember now. The USDA ARS provided an "infestation map" which was duly updated as finds were made in new states. There was little else that we could do other than simply watch *Varroa* spread across the U.S. and finally, Canada. It was a shocking time. In the U.S., beekeepers had essentially no control products. We could do nothing.

My first experience with Varroa

I don't remember the exact details of where *Varroa* was first found in Ohio, but I remember the very first time I ever saw a live mite on Ohio State bees. I was in the main university beeyard in Wooster – a yard that is still in use today. I was making a perfunctory examination of my colonies, when I spotted a marked worker. It was a dark mark not the typical primary color of a marked queen. But I was not doing any work that required marking workers. Did some of my students do this? Strange. Upon a closer look at the odd mark, the mark suddenly moved from the thorax to the bee's ventral surface. Instantly, I knew what that moving mark was. Instantly, I thought I knew what that observation meant, but in fact, I am still learning what that moving mark meant that day. That one moving mark heralded the radical change of my beekeeping life. I no longer had mite-free bees.

The dawn of our chemical frenzy

On October 20, 1987, the Animal Plant Health Inspection Service, USDA (APHIS) approved (Sec 18) plywood strips soaked in Mavrik or Spur for the ***detection*** of *Varroa*. The ¼" thick strips were about 1 ½" wide and about 6" long. They were suspended with monofilament fishing line. Two were used per deep hive body. On December 30, 1987, Sec 18 special exemption approved plywood strips soaked in Mavrik or Spur as a ***treatment*** for *Varroa* control. On March 21, 1988, use of Mavrik and Spur was ***withdrawn*** and was replaced by Apistan™, available still today. This was the genesis of our industry's dependence on chemical controls for *Varroa* and other pests.

Use of these materials today is off-label and illegal. If needed, far more effective and safer control materials exist now.

I only present these historical milestones to demonstrate the desperation that was being experienced by our beekeeping industry. Seemingly these mites were killing every bee colony they encountered and thanks to Tracheal mites before, there were not that many bees left to kill. I wondered if anything would remain. I wondered if I still had a career in apicultural entomology. It was a bleak time and it was going to become even bleaker.

A common site now – Varroa *on a worker bee.*

Africanized honey bees

At the same time our bees were being ravaged by *Varroa*, reports of Killer Bees migrating toward the U.S. were terrifying the public. Low budget killer bee movies were being produced. News reports of people be stung to death were occasionally available. Few were thinking of the grand plan for urban beekeeping. Yes, things were going to become even bleaker.

Next Month in part 2

Beekeeping was probably forever changed by the arrival of *Varroa*. Those of us, who are old, have literally kept bees in two worlds.

Where are we now? Next month, I will continue this thread along more current lines. The public's return to supporting honey bee activities, (2) a review of the life cycle of *Varroa*, (3) Viral effects of Varrosis, (4) a review of mite population estimation techniques, (5) Comments on today's control materials with some casual suggestions about which to use and when, (6) chemical resistance, (7) drone predation and (8) beekeeper emotions about *Varroa*.

This battle is not over – neither the mites nor beekeepers are finished. BC

James E. Tew, Ph.D.,
tewbee2@gmail.com
Blog: www.onetewbee.com
Facebook: https://www.facebook.com/tewbee2
Twitter and YouTube: @onetewbee

Is Monitoring For Mite Levels Necessary?

We all have mites, should we just treat?

Ross **Conrad**

August: Now is a good time to treat for *Varroa* mites...but is monitoring mite levels really effective and necessary?

Varroa destructor is still one of the primary sources of stress that bee colonies and beekeepers have to deal with on a yearly basis. The mite feeds on the honey bee's blood (hemolymph) and since the feeding site doesn't heal, it creates an opening in the honey bee's cuticle that becomes an entry point for bacteria, viruses, and other pathogens. Thus, the mite seldom kills bees directly . . . but rather it weakens their immune systems making the bees, and thus the colony more susceptible to a wide variety of pathogens..

By now most folks are aware of the importance of reducing mite levels in hives early enough in the season that the bees have time to get healthy as they prepare for Winter. It takes healthy bees to raise Winter bees that are healthy enough to survive the Winter. The honey bees that are raised late in the season and live through the Winter do so because they are endowed with a protein laden/fat body called vitellogenin, that acts as an antioxidant and food source and enables the Winter worker bees to live longer than their Summer sisters. Nurse bees that are sick with viruses and other infections may feed developing bees brood food that is laced with pathogens, thereby infecting the upcoming generations with diseases. Sick Winter bees have a more difficult time surviving the stress of Winter than healthy Winter bees.

Mite Monitoring

For about two decades now, beekeepers have been advised to monitor *Varroa* population levels in their hives so that treatments can be applied when appropriate. Numerous techniques for monitoring mites have been developed over the years ranging from collecting a known number of bees in a quart-size mason jar and either spraying the bees with ether and then rolling the jar so that the mites stick to the jar's sides, drowning the bees with rubbing alcohol which will wash the mites off the bees, or adding a couple tablespoons of powdered sugar to the jar with a five-mesh screen cover, and after shaking the jar so that the bees all become covered with sugar and waiting a minute or two, the sugar (and mites) are dumped out into a container. Unlike the first two sampling methods the bees are still alive after the sugar treatment and can be returned to their hive, while water can be added to the powdered sugar to dissolve it and make it easy to count the mites that have fallen off the bees.

Monitoring mites can also be accomplished by counting the natural level of mite fall through a screened bottom board over a 72-hour period. One challenge with trying to use any of these monitoring methods is that they can provide the beekeeper with false results. Too many times I have spoken to beekeepers who insisted that they sampled for mites in late Summer/early Autumn and found very low mite levels that did not indicate that a treatment was required only to have their colonies overwhelmed with mites a couple months later when the weather has turned cold, allowing for fewer treatment options, and closing the window of opportunity for the hive to raise enough healthy Winter bees to make it through the season of dearth alive even when an effective treatment can be applied.

False monitoring results can occur a variety of ways. Some false readings can be caused by the person taking the sample, such as when bees are collected from frames that are not filled with open brood cells ready to be capped and are not covered with young nurse bees that will tend to be among the adult bee population most heavily infested with mites. Results can also be skewed by hive conditions such as when significant amounts of burr comb and brace comb have built up between the frames impeding the fall of mites through the screened bottom board after they lose their grip on their hosts. Even luck can play a role since the bees sampled may just happen to contain a significantly higher, or lower, number of mites than the rest of the colony's population even though they were collected, or counted, correctly.

To help eliminate these pitfalls, some beekeepers

duplicate their monitoring efforts a couple days later in order to confirm the initial results. Not only has it been advisable to monitor and confirm the results before you treat for *Varroa*, but I believe that if you are going to monitor at all, it is even more important to monitor mite populations following a treatment to try and measure the treatments effectiveness. Sampling colonies more than once, or taking two or more 72-hour natural mite fall counts are likely to give you a more accurate picture of the mite loads in your hives than a single effort.

The Underlying Reason For Monitoring...Still Valid?

Historically there has been good reason to take the time to monitor *Varroa* population levels in hives. The use of toxic chemicals to control pests has consistently resulted in the development of pests with resistance to chemical treatment. By avoiding treatments that are unnecessary when pest population levels are low, the speed with which chemical resistance will develop is reduced. In addition, most treatments are not cheap. Significant savings can be realized by applying treatments only when necessary, especially in commercial, or side-line operations with numerous hives. However, times have changed and these reasons to monitor for *Varroa* may not be all that applicable any more.

It is the rare beekeeper that is still using the approved hard chemical treatments for *Varroa*: Apistan (fluvalinate) and Checkmite+ (coumophos). Since these products utilize a single mechanism to short-circuit the mite's biological system resulting in death, *Varroa* developed resistance to these compounds within a relative short period of time (three to five years). This fact combined with the warnings revealed by research that these chemicals build up in the beeswax and can have sublethal impacts on colonies has resulted in the majority of beekeepers now using soft chemicals to treat for mites . . . if they treat at all. These alternative treatment options work in ways that make the likelihood of the mite's developing resistance remote.

Manufactured chemical compounds like fluvalinate, coumophos, and the unapproved yet too often used, amitraz, tend to work by confounding a single biological mechanism within the target organism. This is part of the reason that pests are able to develop a level of tolerance to them relatively quickly. Treatments manufactured with natural ingredients on the other hand, tend to be composed of a complex mixture of compounds that act synergistically and often create a multi-pronged threat to pests. Materials that are toxic to pests through a variety of pathways are much less likely to lead to pesticide resistance within a few years, if at all. The mite treatments ApiGuard®, Api-Life VAR®, and HopGuard™ all fall into this category. Other treatment options such as powdered sugar dusting and organic acid treatments such as the MiteAway Quick Strip (MAQS) work physically which, at least in theory, prevent *Varroa* from being able to develop resistance of any kind.

Should *Varroa* Monitoring Recommendations Be Changed?

Given that the recommendation to monitor mite populations in hives is partly driven by a desire to curb the speed with which *Varroa* will build up resistance to treatments, the need to monitor when using treatments that are unlikely to lead to resistance makes the need for monitoring questionable. Beekeepers may be better off assuming that mites are present (as their ubiquitous nature undoubtedly ensures that they are) and automatically treat at the appropriate time of year.

There is the economic argument that says that if treatments can be avoided when they are not needed, costs will be reduced and profitability increased. In commercial beekeeping operations however, it is the rare business that will absorb the labor cost associated with monitoring for mites. It tends to be cheaper and safer for beekeeping outfits to simply treat all their hives "just to be sure." Once I began keeping more than a dozen or so hives, I gave up on monitoring and just treated all my colonies as a matter of course, usually once in Autumn. Given the propensity for the various monitoring techniques to provide false readings, it may be prudent for small-scale, and backyard beekeepers to do the same . . . forgo the time and energy it takes to try to evaluate the level of mite populations in colonies and automatically treat their hives for *Varroa* once or twice a year with a soft chemical treatment. Sure some money may be spent unnecessarily on occasion, but such an expense is minor compared to the cost of replacing a colony of bees that have died because a false reading indicated that a treatment was not necessary. Besides, even the most costly mite treatment on the market is fairly inexpensive when you only have one or two hives that need treating. If you are among the minority of beekeepers that still use the hard chemicals for mites monitoring makes a lot of sense, but at this point it seems that the value of monitoring for beekeepers who use soft chemicals is really only obtained after the fact in an effort to confirm that the treatment was effective. BC

All The Buzzzz in...

Hello Friends,
Summer is coming to an end. Happy learning as you go back to school.
Bee B. Queen

Brooke Alvear, 3, FL

Bee B. Queen Challenge

Next month is National Honey Month. Let me know how you use honey.

Rosalyn Sommers, IA

Darcy, 5, FL

I heard the buzzing of a bee.
I looked up high into the tree,
And, lo, what did I see?
The little body of a bee.

Now, I like bee
And I think the bee likes me,
But swiftly I left, lest the bee should see
And think to sting harmless me!

Rosalyn Sommers, IA

Honey Here, Honey There

Honey can come in different forms. We are most familiar with liquid honey. Over 90% of the honey we use is in liquid form. Let's take a look at other ways to package honey.

Comb Honey

This is honey still in the beeswax comb taken straight from the hive. Before our modern day extractors, almost all honey was in this form. Producing comb honey does require some knowledge, techniques and hive equipment to successfully harvest and package. It sells for a higher price than liquid honey.

Liquid Honey

Liquid honey is extracted from the honey comb by centrifugal force, gravity or straining.

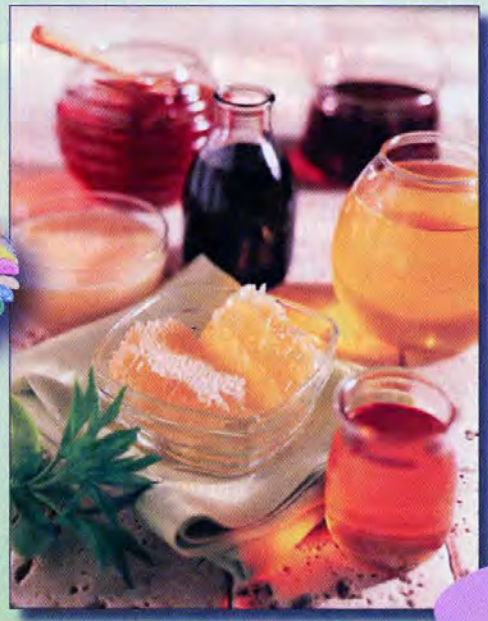


Photo thanks to the National Honey Board.

Creamed Honey

This spreadable honey is made by controlling the way honey crystallizes. The crystals in creamed honey are very, very small making the honey smooth like butter but not dippy like liquid honey. How are these small crystals formed? Good question.

When honey crystallizes, the granules will copy the size and shape of any crystals that are already in the honey. Because of this, a little creamed honey which already has tiny crystals, must be added to start the crystallization process to produce this creamy honey.

Many people around the world prefer creamed honey. You can make it yourself in your kitchen.

There are a number of good videos on You Tube showing how to make comb honey and creamed honey.

Dried Honey

Dried honey can be found as flakes, granules, crystals or as a powder. Dried honey often contains other ingredients like sugar and starch to keep it from clumping up. In most cases there is between 50% and 70% of actual honey in commercially available dried honey. This product can be easily blended with other dry ingredients.

Chunk Honey

Chunk honey is pieces of comb honey placed in containers and covered with liquid honey.

Bee kid's corner

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

Take the honey to the farmer's market.

Making Creamed Honey

Make your own delicious, smooth, creamed honey. You will need creamed honey to use as a starter.

1. Begin with fresh honey or warm the honey to make sure there are no crystals already present.

2. If you heated the honey, let it cool.

3. Add creamed honey as a starter. You can buy it at a farmers market or supermarket in the honey section. The ratio is about 1 part creamed honey to ten parts liquid honey. This measurement does not have to be exact.

4. Thoroughly blend together. Avoid air bubbles by mixing the honey below the surface. Do not whip.

5. Cover the honey and let it stand for about 12 hours. Scrape off the air bubbles on the top of the mixture.

6. Pour into tubs or jars.

7. Store this mixture at about 57° for 5 to 7 days. If it is too warm, the honey will not cream properly. Depending on where you live, you may want to wait for cooler fall weather to make this.

Professor Elton J. Dyce, from Cornell University, developed this method of crystallizing honey in 1928.

Bee Buddy

This spring ten year old Johnny Shetler caught his first swarm at his aunt's house. He had quite an audience that day! He helps his dad keep bees but now he has his very own hive. Extracting honey is something Johnny enjoys. He hopes his hive will make enough honey this year to sell.

Johnny enjoys playing baseball, riding his pony Sparky, and fishing at his grandpa's pond. With two brothers and two sisters, he stays busy on their family farm in Ohio.

Happy Beekeeping Johnny!

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.

Floral Designer To Beekeeper

Judith **Adamson**

It was in the early Spring of 2007 that my husband Mike and I began to notice an unusual amount of bee activity in our backyard. We watched more closely and saw that bees were coming in and out of a plaster of paris container that we were using as a plant stand. The bees found a small opening (and that's all it takes) which gave them access to the round, dark, empty interior – a perfect place for building a small hive. I had some reservations about keeping bees and what that would involve because I was afraid of getting stung but quickly got used to them being a part of our lives. As Mike said, "It's as if they adopted us, saying 'oh, this is a good place to hang out, let's live here.'" And that was the beginning!

This certainly wasn't your typical modern hive; it was similar to the conical shaped beehives the ancient Greeks and Egyptians used to weave from straw and grass. The container was 12" high with a 12" diameter, open at each end, tube-like. We placed a board over the top to protect the bees from the elements. Viewed from above, the honeycomb didn't have any pattern but when flipped over, you could see the remarkably organized combs hanging vertically down from the "roof" of the container. With such a small hive we weren't able to harvest honey without disturbing them.

Because it was so small, it soon became over-crowded and led to swarming. The first time the bees swarmed I was hanging laundry. Suddenly I heard a loud buzzing sound. I looked up to see a large, dense moving mass of bees slowly rising up into the air. It was an amazing sight and sound, and at that time, not knowing anything about bees, I put the laundry basket over my head and ran into the house. I laugh now thinking about that scene and have since learned that I was quite safe because swarming bees are gorged with honey and have no territory to defend. They landed 20' up in a neighbor's pine tree, temporarily, until they moved on once again to parts unknown.

We tried to get the remaining bees to move into a standard hive, which would give them more space, but nothing worked – they refused to move in, obviously preferring the small, warm space they created. These bees were very gentle, and I was quite comfortable being close to them without any fear of being stung. Eventually and sadly, the bees didn't make it through the winter, but by then Mike and I were both hooked and decided to become beekeepers.

Original hive.

The following Spring, we started up with a swarm from our friend and fellow beekeeper, Laurie, and set up a standard hive. Bees mostly swarm in the spring, increasing their numbers. While it's possible to control swarming to a certain degree, it's easy to fall behind when numbers are building up quickly and if stretches of rain keep you out of the hives. Most of the swarms have landed in our yard or in a neighbor's yard, so we've been lucky in being able to capture them and there is always someone who needs more bees. We had already spoken to our neighbors about keeping bees, and no one minded that 40,000 new creatures had taken up residence in our yard. They all seem to enjoy their presence, which has the added bonus of having their fruit trees and gardens flourish.

Once a swarm landed in jasmine and, because they were entwined among the vines, they were quite difficult to remove. Laurie came over to help, and we tried "scooping" up as many bees as we could, hoping the queen was among them. We dropped the bees into a small carrying case called a nuc box, which is used to collect and transport swarms. When bees swarm, they cluster around the queen, protecting her, and wherever the queen is, that's where the rest of the bees will follow. We ended up building a ramp from the vines, where most of the bees were still gathered, to the nuc box. It took a couple of days, but they eventually all made it into the box. Laurie and I have been passing bees to each other ever since that first season.

By the Summer of 2010, we had our first honey harvest from our three hives: seven frames (close to 25 pounds of honey), which we shared with neighbors and friends and still had plenty for us.

I've come to love having the bees and enjoy watching them collect nectar and pollen. A great time to watch them is in early afternoon, when the young bees take their "maiden flight." They start out by flying in

small circles, gradually building up distance from the hive as they learn to identify their surroundings.

Gradually, I've been transitioning my garden to bring in more bee-friendly plants. We're lucky in the Bay Area because there is an abundance of flowers that grow well and provide ample nectar and pollen. The bees especially love a nearby eucalyptus grove, which flowers over the late Winter and provides a needed source of food during that time. It's been a new focus for me – I had my first garden when I was five, filling my red wagon with violets, johnny jump-ups, wild asparagus and strawberries. I still have some of the same types of plants in my garden now – fond remembrances of that early start. There are many fruit and citrus trees in the neighborhood, as well as redbud – all favorites of bees. Our backyard has an established garden which includes a large mock orange tree, pussy willow, hardenbergia, germander, catmint and mallow which are covered with bees in the Spring. There's also California lilac, thyme, lamb's ear, lavender, rosemary and oregano which are a few of their other favorites.

What the bees are foraging affects the flavor of the honey and how quickly it crystallizes. All the local honey I've tried has a slightly different taste. Eucalyptus gives a light, sweet taste – quite delicious! It's been found that bees are attracted to gardens that have a variety of around 10 of their favorite plants, grown in patches with successive blooming seasons. Every Spring there's a Bay Area native garden tour where one can visit gardens which showcase native plants.

Current hives.

Since learning about bees, I've also discovered that a certain percentage of native California bees live in the ground. I've removed mulch from certain areas in my garden because the bees require undisturbed, bare earth in order to build their tunnels and live. There are around 25,000 bee species in the world, with around 1,500 in California, of which approximately 76 are native. Bee gardens are getting more popular, and one can create a beautiful setting for oneself while providing food for bees. This year I joined the Sunflower Project, growing a particular variety of sunflowers to monitor the bee population.

Now in 2012, I look at all I've learned about bees. While being hands-on is the best teacher for learning, there are many sources from which to learn beekeeping – books, classes, bee association and the bee friends we now have. There are some great websites for information also. My bee garden is flourishing and the bees are thriving. We had a great and early start to the year and for the second season we're selling our honey at a local farmers market, which is great fun and a new adventure. BC

Pat Gibbons, Pat Gibbons Floral Design, www.patgibbonsfloral.com; 510-527-3197; pat@patgibbonsfloral.com

Thoughts On Bee Removal

Jim **Thompson**

With The right Tools And A bit Of Experience You Can Do Some Of These Removals

Beekeepers get calls from people who have honey bees in their house. The bees can be in the walls, behind brick fireplaces, in the ceiling, the soffit, the attic, or almost anywhere. The bees may be entering at any level and there could be multiple nests in the house. I once heard a man from California mention that he took 18 swarms out of the four sides of a house. I also know a man that removed a swarm from a grain storage building that had 2x6 studs and no fire blocking. That swarm covered an area 6"x24"x16'. Still other swarms have attached themselves beneath a solid (with the single hole) iron manhole cover, inside a discarded hot water heater, inside a squirrel box and even been found in bird feeders. Because of this variety beekeepers usually visit the scene to make an assessment as to what needs to be done and the equipment needed, and if the bees are actually honey bees. At least until they get some experience.

Some swarms are easier to remove than others simply due to their location and if the initial structure is going to be saved or not. Obviously if one can stand on the ground to remove the swarm it is safer to remove. Bucket trucks and scaffolding are expensive but useful for high swarms. Working off tall ladders is dangerous and should be avoided. If the bees are high off the ground the stinging danger on the ground is reduced and it could be determined to leave the bees alone, but if the house is lived in or going to be remodeled the bees must be removed.

Honey bees lack the necessary mouth parts to chew solid wood however they can remove paper and insulation. Thus, honey bees usually occupy an existing cavity. Once in a space they investigate and are drawn by the light so it is common for bees to emerge inside the house through electrical outlets, window casings, or ceiling fixtures.

Honey bee swarms can gather large amounts of nectar in short periods of time. I have seen a swarm fill a deep super of comb with honey in one week. That means hundreds of pounds of nectar were collected. Since the honey is used by the bees to be their food source through the Winter if a nest is to be removed in the Fall, you can expect an abundance of honey in the comb. If the nest is to be removed in the early Spring less honey will be present however it may be too cold for the bees to be exposed. That means the time from late March to late June as the optimum months for bee removal.

One method of bee removal by nondestructive means is by using a swarm trap and has very critical timing. A hive is placed about 50 feet away from the house, attracting the swarm issuing from the house. This hive is removed in the evening as soon as it is occupied. Then, to get the remaining bees a 12-inch cone with a ¼" outside opening is placed over the entrance and all other entrances are securely blocked. A miniature hive (nuc) is placed near the cone with a frame of brood attracting the bees that are displaced by the cone. The miniature hive is used because it is light weight and it is usually hung. When the nuc becomes full of bees it is replaced with another empty one. This operation is repeated until there are no more bees coming from the house. When no more bees are coming from the house, the cone and other entrance blocks are removed and a new hive is placed nearby to rob out the remaining honey in the house. Then the entrances are caulked or blocked shut. If the timing is correct the whole process takes about one month, but if your timing is off or the bees find another entrance you may have spent six months and still be unsuccessful in removing the bees.

Honey is the issue in whether the bees are removed or not. As long as the bees are alive, they keep the honeycomb cool enough to contain the honey. If one would spray and kill the bees the wax would collapse on a warm day and the honey would run everywhere. Once drywall becomes soaked in honey there is no way to paint the surface. Once an active hive is killed by an insecticide the honey may also be contaminated and is worthless. There will be a smell of dead bees in the walls and eventually there will be ant, beetle, or moth problems. Maybe worse.

Lately professional exterminators have decided that due to the shortage of honey bees it is illegal to spray honey bees. In reality to remove a colony from a house and still guarantee their work they must remove the honeycomb and honey. Therefore the easy excuse is to say that it is illegal to spray and kill honey bees.

Many beekeepers will shy away from bee removal from houses because they lack the proper equipment or the proper carpentry skills. Some have a fear of being sued and often the acquired bees are not really worth the effort. Obviously if you lack the proper equipment such as scaffolding, circular saws, reciprocating saws, bee vacuum, screw guns and more, you shouldn't attempt bee removal.

Plus, you should know how a building is put together so no structural damage is done on the removal. For everyone's safety, you should have insurance. And, you should have a written agreement prior to doing any work.

I no longer remove bees from buildings but over time found that every situation is different. Most of the houses have had wood siding however those that have plastic, composition, or aluminum siding must have the long strips of siding removed if you take the bees from the outside. Sometimes you must take apart an inside wall or ceiling to get the bees. In those cases sealing off the room with plastic and having an outside open window is helpful. It is also helpful to have electricity to run the power tools however sometimes you must have either gas powered tools or a generator.

The removal of the bees and transferring to a hive would be similar to the following. The boards on the side wall should be numbered on both the removable section and the stationary side. A circular saw is set to the depth of the siding. Then the boards are cut on the inside of both studs so the remaining pieces can be anchored and are flush to the opening. The center pieces are carefully removed to leave the comb still in the cavity. The bees are smoked lightly and you should have an empty hive to hold a variety of special frames and some empty queen cages near. I have found a bricklayers trowel is very helpful but you can use spatulas, knives and even hive tools to cut, carry and install comb into the frames. The comb normally has about a 21 degree upward angle, so it should be reinstalled in the frame observing this angle.

I have used two special frames in the operation. The first is a standard empty frame where I have driven several common brads into both sides of the top and bottom boards of the frame leaving the heads of the nails protruding about 1/8". The heads of the nails will hold a cotton kite string and are staggered about 2½" apart. One side of the frame is laced and tied. The open side of the frame has the string tied at one end. This makes a pocket for you place the comb pieces in.

An alternative to the nails is to use a stapler. When complete, you simply lace and tie off the other side and place the frame in the hive. Let the bees cling to your completed frames. Use this type of frame for the brood cells.

You should have a bucket of water and a towel to clean your hands and always look for the queen. If you find the queen catch her and put her into one of your queen cages along with some attendants. Place the queen cage on the bottom board and keep the hive out of the sun.

The second type of frame that I have used has the end pieces cut from a 2x4. They are 1½" wide and about ¾" to 1" thick. The ends have a solid slat bottom bar and ½" hardware cloth on both sides. These frames provide a pocket for any size and shape comb. Therefore I have used them to put the comb honey and odd pieces in. When you get one super of frames full, place it in the shade nearby and fill the next one until the house cavity is empty. Some beekeepers use ordinary frames and tie the comb in by looping string or strips of cloth while others use special sized rubber bands. Most of the bees should now be with the hives which you have put together to be moved in the evening.

Scrape and wash the house cavity to eliminate any wax and honey. Cut 1x2s slightly longer than the opening and nail or screw them to both studs. Place insulation into the opening and replace the removed siding by the numbers. Secure the siding to the 1x2 strips and caulk the joint.

For bees in the ceiling, I have used long pipes to extend beyond the swarm and smoked the bees out toward the opening. When the bees came out I vacuumed them and then removed the comb with a tile shovel. This method is not as successful as taking the ceiling apart and removing the bees that way, but sometimes that's not possible.

A similar removal is taking bees out of a tree. All of the tools used are the same except for the addition of a chain saw. The tree section that contains the bees is trimmed until you can see comb at both ends. Cut the tree section on both sides making sure to cut only the wood. The blade should be aligned between the combs, so very little damage is done if the blade goes too deep. Transfer the bees and discard the tree trunk from the area. This operation should take about one hour to complete.

Bees on the underside of manhole covers can be cut off and transferred while the bees in a discarded hot water heater may have to be trapped out. Don't make any guarantees because you will still have comb inside the tank. Squirrel boxes and bird feeders usually have to be disassembled.

Most of this bee removal is done to satisfy the safety of the general public however there might be a chance that somewhere the beekeeper may obtain a special genetic strain of honey bee. BC

Colony Collapse Disorder

An Incomplete Puzzle

J. Kim **Kaplan,** USDA News Service

When it comes to solving the puzzling syndrome known as "colony collapse disorder" (CCD), which has been attacking honey bee colonies since 2006, the best that can be said is that there is good news and bad news. The good news is that the rate of honey bee losses seems to have leveled off rather than continuing to increase. The bad news is that the cause or causes of CCD remain unclear.

In the United States, the problem surfaced in October 2006, when an increasing number of beekeepers began reporting losses of 30 to 90 percent of the hives in their apiaries with no apparent cause. The defining characteristic of CCD is the disappearance of most, if not all, of the adult honey bees in a colony, leaving behind honey and brood but no dead bee bodies. This definition has recently been revised to include low levels of *Varroa* mite and other pathogens, such as *Nosema,* as probable contributing factors.

For the last 3 years, self-reported surveys of beekeepers have found that Winter colony losses have averaged about 30 percent, with around one-third of those losses ascribed to CCD, according to Jeff Pettis, research leader of the Bee Research Laboratory in Beltsville, Maryland, who heads up the Agricultural Research Service's CCD research effort. This compares to colony losses that were averaging 15-20 percent before CCD.

"The faint good news in the survey numbers is that the CCD problem does not seem to be getting worse," Pettis says. "But – and this is a big 'but' – 33-percent losses each year are probably not economically sustainable for commercial beekeeping operations."

While many possible causes for CCD have been proposed, reported, and discussed – both in the scientific literature and popular media – no cause has been proven. (See sidebar.)

"We know more now than we did a few years ago, but CCD has really been a 1,000-piece jigsaw puzzle, and the best I can say is that a lot of pieces have been turned over. The problem is that they have almost all been blue-sky pieces – frame but no center picture," Pettis explains.

The bee lab's scientists have been looking for the cause or causes of CCD within four broad categories: pathogens; parasites, such as *Varroa* mites or *Nosema;* environmental stressors, such as pesticides or lack of nectar diversity; and management stressors. The researchers have been analyzing samples from healthy and CCD-struck colonies and applying a variety of stressors from the four groups to colonies in hopes of provoking a colony response that duplicates CCD.

"While a number of potential causes have been championed by a variety of researchers and interest groups, none of the causes has stood up to detailed scrutiny. Every time someone has proclaimed a potential smoking gun, further investigation has not been able to make the leap from correlation to cause-and-effect for one reason or another. Other times, there hasn't even been a scientific correlation," Pettis says.

ARS's research work, along with that of university and other scientists, "pretty well supports the idea that CCD is caused by multiple factors – possibly working individually, but more likely in combination," Pettis adds. "But we still can't say whether it's the same set of factors in every CCD incident or – if it *is* the same factors – that they are occurring in the same sequence in every case."

Pathogens continue to stand out as one of the important puzzle pieces, according to ARS entomologist Jay Evans, also with the Bee Research Laboratory. He was part of a team that used genetic analyses to look for correlations between bee health and bee pathogens and activity levels of honey bee genes.

Two picornalike viruses – acute bee paralysis virus and Kashmir bee virus – along with deformed wing virus, black queen cell virus, and two species of *Nosema,* were found to be more abundant in CCD hives. Infection by multiple picornalike viruses could result in honey bees having reduced abilities to synthesize certain proteins, the lack of which would leave the bees more vulnerable to additional stresses like pesticides, nutrition problems, or other pathogens – which sounds like a possible root cause of CCD, Evans points out.

When the researchers looked at the bees' turning on of detoxification

Jeff Pettis, USDA Research Leader.

Jay Evans (L) and Ryan Scwarz looking at Nosema spores.

and immune genes, which would have reflected exposure to either pesticides or disease, respectively, there was no significant difference between CCD and non-CCD colonies.

The team did find considerable differences between CCD hives on the west coast and the east coast. "Finding Kashmir bee virus in a hive was the best predictor of CCD in the western United States, while deformed wing virus, an unrelated RNA virus, was a better predictor in the East," Evans says.

Evans and Bee Research Laboratory colleague Judy Chen were also part of an international team that closely followed 29 European honey bee colonies, carefully monitoring for pathogens, parasites, and bee proteins. This study found that four factors appeared to be the best predictors so far of Winter honey bee loss: presence of the microsporidian *Nosema ceranae;* levels of the protein vitellogenin, which strongly reflects the bee's protein status and plays an immune system role; *Varroa* mite infestation; and the presence of deformed wing virus, a virus often associated with *Varroa* mites.

Finding *Varroa* mites to be a good predictor of Winter declines in this study was not really surprising, according to Evans, though other studies in the United States have not found as high a correlation between CCD and *Varroa* mites.

"Even if *Varroa* mites themselves do not directly cause CCD, we know they can transmit multiple viruses to honey bees," Evans says, "and higher total pathogen levels (rather than infection by any specific pathogen) have been our best correlation with CCD so far. But should the pathogens be considered primary casual agents – multiple pathogens specifically causing CCD – or are they indirectly involved because they weaken bees, making these bees more vulnerable to something else we don't know yet?"

Pesticides as Cause?

Pesticides – individually and in general – have been repeatedly nominated as a cause of CCD, often without direct scientific data to support the idea. In a pesticide survey conducted by U.S. Department of Agriculture and university scientists that analyzed wax, pollen, and bee samples for the presence of 121 different pesticides or their metabolites, the most commonly found pesticides were fluvalinate and coumaphos. While about 60 percent of the 259 wax and 350 pollen samples did show the presence of at least one systemic pesticide, almost all were found at levels well below what is considered lethal to honey bees.

There was no overall pattern of exposure among the samples for a specific pesticide or class of pesticides. The study did not look specifically at the pesticides as they might be related to CCD, but if a specific class of pesticides were involved, a pattern of residues should have been discernable, explains Pettis, who coled the study.

Not all pesticide impact is about directly killing honey bees, however. Sublethal doses of the pesticide imidacloprid – one of the neonicotinoid group of pesticides – were found to make honey bees more susceptible to the gut parasite *Nosema,* according to a study by Pettis and University of Maryland researchers Dennis vanEngelsdorp, Josephine Johnson, and Galen Dively.

The researchers fed three generations of honey bee colonies either five or 20 parts per billion (ppb) of imidacloprid, which is used to protect a wide variety of crops and ornamentals from many different insects. The dosages used in the study were intentionally well below the levels that have been documented to kill honey bees after short-term exposure and reflected levels that have been measured in the environment.

After the third generation, newly emerged adult bees from these colo-

The Usual Suspects...

Since CCD has risen to such prominence, suggestions for its cause have been many. Here are a few that have been, mostly, discredited.

Migratory beekeeping – Stressful, absolutely; the cause, probably not
Monoculture – Yup, single source nutrition is a stress, but not CCD
GMOs – not everybody gets to eat GMOs on a daily basis
High voltage electrical lines – not enough of them in enough places
HFCS – But some get CCD and never touch the stuff
Climate Change – This summer anything's possible
Lack of genetic diversity – but even Russians get CCD, sometimes
Ozone – decreasing, yes; but the timing doesn't work
The Ozone Hole – not big enough any more
Cell Phones – most beeyards don't have reception
Cell Phone Towers – see above
Reversal of earth's magnetic poles – that may happen, but not yet
Jet plane Contrails – but they've been here longer than CCD
The Hummmmmmmm – only in sommmmme places
Aliens – why just the bees? And why his, and not yours?
Crop Circles – That guy in England seems to get around
The Rapture – Can't be, the beekeepers are still here
Zombie Bees – Only, it seems, in California

nies were exposed to spores of *N. apis* and *N. ceranae*, gut parasites that have been a growing problem for U.S. beekeepers since the 1990s.

There was up to a fourfold increase in the levels of *Nosema* in honey bees from the imidacloprid-exposed colonies, regardless of whether five or 20 ppb were fed.

"While these increased *Nosema* levels were found in individual bees, there was no measurable impact at the colony level," Pettis says. "Imidacloprid was chosen for this study because of its widespread use and beekeepers' concerns about it. But it was only found in three percent of the pollen samples checked in the pesticide-survey study, usually at very low levels, and no connection with CCD has ever been made scientifically," he adds.

To better account for such sublethal impacts, Pettis is working as part of an international group of scientists and regulators to help the U.S. Environmental Protection Agency (EPA) develop recommendations for pesticide-testing guidelines that factor sublethal effects into test protocols. ARS scientists have already developed a sublethal-impact cage assay that has been provided to EPA.

Could imidacloprid and *Nosema* together be the cause of CCD, as some claim? "This study did not look for nor establish any connection between either imidacloprid or *Nosema* and CCD," Pettis explains. "But the effect of the combination of imidacloprid and *Nosema* demonstrates that there are many complex interactions between stress factors that need to be considered in looking for a cause of CCD and high honey bee mortality in general." BC

This research is part of Crop Production, an ARS national program (#305) described at www.nps.ars.usda.gov.

*To reach scientists mentioned in this article, contact Kim Kaplan, USDA-ARS Information Staff, 5601 Sunnyside Ave., Beltsville, MD 20705-5128; (301) 504-1637, kim.kaplan@ars.usda.gov.**

Master Beekeeper Programs, Part One

The exams may be the easy part

Ann **Harman**

A visit, via the Internet, to all the state and regional beekeeper associations plus a few universities actually produced only thirteen states and one of the three regional associations with a Master Beekeeper program. True, others may exist but information was not found. The distribution throughout the U.S. is interesting: nine states are east of the Mississippi, one is Midwest, one is West, and two are West Coast. Here are the states: New York, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Ohio, Nebraska, Montana, Oregon and Washington. The regional association is the Eastern Apicultural Society.

Five of the state associations

have new programs that are still under construction: Virginia, Alabama, Ohio, Montana and Oregon. The Master Beekeeper program of North Carolina is undergoing some changes. Perhaps the oldest Master Beekeeper program, begun by Dr. Roger Morse in 1976, is that of New York, closely followed by the Eastern Apicultural Society (EAS) in 1981. Dr. Morse originated the EAS program patterned after that of New York.

Now we will see how an interested beekeeper can find out about a Master Beekeeper program in the above states. We will visit the websites of those state associations and universities and the one regional association. I did this and to make comparisons I printed out the information presented. The result was a stack of paper over two inches high. This information was achieved with ease in some cases but frustration in others. Of course a beekeeper who belongs to a local or state association may be familiar with Master Beekeepers within that state and can obtain information more easily than a non-member.

In general, information from the websites ranges from rather incomplete to very confusing. Reading through all the information left me with numerous questions although not all the same questions.

Before we tackle the programs themselves, let's see how easy it is to find information. If someone just Googles a state association in our list, seven states have Master Beekeeper information immediately available. On the Ohio state association home page a little exploring is necessary since the Master Beekeeper program is under "Resources."

For New York a Google will show you "other New York state beekeeper groups – master beekeeper." When that is opened the home page is for the Dyce Laboratory. That piece of information is the beginning of some confusion. However one can open "Master Beekeeper" that leads to information. The information is minimal. When the Journey page or Master Beekeeper page opens you find that the Master Beekeeper certification will be done by the Eastern Apicultural Society. The Journey Level information indicated that it is designed for transitioning to commercial beekeeping. Adding to the confusion, on this page one sees the announcement of IPM workshops "not for those who have taken the apprentice level courses!!!" Emphasis is theirs. I would hope that further inquiry would clarify all those points.

The Florida State Beekeepers Association Home Page shows no specific place to find Master Beekeeper information. By chance I clicked on "Benefits" having to do with benefits of association membership. This opens a full page describing all the benefits of belonging to the association. In one paragraph the Master Beekeeper program was mentioned and gave a link. This opened up the University of Florida Extension program and here was the information for the Master Beekeeper program. If I had not opened up "Benefits" and read that page I doubt that I would ever have found the program.

Although I was aware Georgia had a program I knew no details. When I opened up the Georgia Beekeepers Association website, by going to "Events," I managed to find four announcements of exams on the "Certified" level. Although there is no information about various levels, or indeed about the Master Beekeeper program, I assumed Certified is the first level. Questions about the exams could be directed to two people. When I sent a questionnaire to one of those it was directed to the University of Georgia. I then went to the UGA-Entomology website. There I did find information, although to find much of it required visiting a number of links.

The complete mystery is Nebraska. In a conversation with Dr. Marion Ellis of the University of Nebraska several years ago I found that a Master Beekeeper program existed. Since I could not find any clue, link or words on the state association site I chose to "Contact Us" that opened up an email form. I used that to ask whether Nebraska had a Master Beekeeper program. A prompt answer verified that Nebraska does have a program. My return email question was how could a beekeeper find information about the program. The answer to that request was a suggestion to contact Dr. Marion Ellis.

I sent an email to him and did receive more information. In the first week of January information on the Master Beekeeping Workshop is entered on the website of the Entomology Department of the University of NE. In addition an announcement of the Workshop appears in the newsletter of the Nebraska Beekeepers Association. Upon opening that website again I found the announcement on "Calendar" and also the 2012 Work-

shop was announced in the November 2011 newsletter. Since I am not a member of NBA I was not able to open any of the 2012 newsletters. Dr. Ellis said that the Master Beekeeping Workshop is limited to 60 people each year so announcements of it and the dates are sent to NBA members first before notices are put into *Bee Culture* and *American Bee Journal*.

In the journal notice and in the University of Nebraska Extension brochure (found on the Entomology Department website) a contact email was given to obtain a schedule and list of presenters at the Workshop. On May 12, 2012, I sent an email to this address to receive the information. The reply was prompt – but useless – an automatic "out of office" reply for April 18, return on April 19. Well, I will try again in a few days but do not feel very hopeful.

I did not try again but on May 16 received a reply. I did receive the full schedule for the 2012 program. However, I was offered the number one spot on the wait list to attend but I had not asked to attend, only asked for some information.

Although I had opened up the Montana Beekeepers Association website I found no mention of a Master Beekeeper program. However I was later informed that a program probably existed. Taking a clue from states whose programs were university-governed, I was able to track down and receive some excellent information. The program is called Beekeeping Certificate Program and is new and still being organized.

After reviewing all the material in the printouts from the various states it became apparent that each state and EAS has their own program design. Nothing is standard. So let's have a look at these programs.

Some states have three levels; other states have four. But EAS and Nebraska have only one. The general term of "Master Beekeeper" did open up information but names of the levels were not comparable. "Certified" was applied to both the initial or lowest level in some states and the second level in others. The top or last level could be either "Master" or "Master Craftsman." The top level of Ohio is "Master Instructor." Some states used "Apprentice" for the beginner level. One state used "Qualified" followed by "Certified" but those terms seem vague. "Journeyman," used by some states, was for the second level (three states avoided the "man/woman" problem by just saying "Journey"). The Oregon program is still being formed.

State	First Level	Second Level	Third Level	Fourth Level
NY	Apprentice	Journey	Master (EAS)	
VA	Qualified	Certified	Master	
WV	Apprentice	Certified	Master	
NC	Certified	Journeyman	Master	Master Craftsman
SC	Certified	Journeyman	Master	Master Craftsman
GA	Certified	Journeyman	Master	Master Craftsman
FL	Apprentice	Advanced	Master	Master Craftsman
AL	Apprentice	Experienced	Master	Master Craftsman
OH	Apprentice	Journey	Master	Master Instructor
NE	Only one level	--	Master	--
MT	Apprentice	Journeyman	Master	
OR	Apprentice	In future	In future	
WA	Apprentice	Journey	Master	
EAS	Only one level	--	Master	--

The table shows the levels and their designations.

Now let us look at something that should be very concrete – are there fees for entering or achieving a level in these programs? If so, what does the fee cover? I should have realized that an answer would not be simple.

In New York the Apprentice Level Course in Spring (a course – no information about whether this is required to become an Apprentice) costs $175 and includes a workshop manual. The accompanying Fall course is $85 and includes a workshop manual (no indication whether the same one or different). The mysterious Integrated Pest Management courses have fees but these may or may not pertain to the Journey level. To achieve the Master level one will have to see what fees, if any, EAS has.

In Virginia the fee is listed only on the application form – $25 for each level and the notation ". . . includes the written and practical testing." For North Carolina the first page of information states ". . . there is no cost to program participants." However other information states that there is no charge for the initial (Certified) level but $10 each for Journeyman, Master and Master Craftsman levels. It is stated that the beekeepers should be willing to support the program. The fee is for certificates, medallions and nametags as well as entering data into the data bank. Such confusion is partially understandable since the program is undergoing change. Fortunately subsequent information from the state association indicated that the website was being significantly changed and updated.

South Carolina has a fee schedule of $5 for the first level, $10 for the second and $15 for the third and fourth level. It is not specified whether it is $15 for each of the upper levels. No information is given on what the fees cover. Florida's information sheets do not mention any fees. In Alabama you will pay $40 to take the Apprentice class and exam plus you must pay $10 for membership in the Alabama Beekeepers Association, plus the fees necessary to register your hives with the Alabama Department of Agriculture if you live in Alabama. Ohio charges $5 for materials in the Apprentice Level and $20 for materials and administration for the Journeyman level.

Nebraska offers a Master Beekeeping workshop, three days, for $140 that covers five meals, a workbook, a cap and refreshments. Oregon charges $100, non-refundable, to register for the Certified Apprentice Level. You will receive "a packet with all the information necessary to achieve this level." Since this is a new program, no information is available for the higher levels. In Washington the charge is $15 for the Apprentice Level, ($10 for the book – unnamed – and $5 for postage). EAS has just one level and charges $100 to apply. If any of the exams must be retaken the charge is $25 each. No information is given on what the fees cover.

In Montana the Apprentice-Level Beekeeping Course costs $325 but it is an intensive one, three evenings a week for three weeks. The fee is for salaries of the university instructors, the materials and advertising. The

course is optional if a beekeeper has certification from another program but must take the exams and fulfill other requirements.

You can see there is no easy road to finding information about the 14 Master Beekeeper programs. A questionnaire has been sent to all in the search for clarification as well as information that is lacking on the Internet. In Part 2 of this series I will continue with the information supplied by the websites and questionnaires about such items as whether classes and workshops are offered or required and what are the criteria for entering both the program and also to achieve each level. I will dig deeply to find the answers to the numerous questions tumbling around in my mind as I read through the stack of paper. BC

Ann Harman has a great deal of experience with Master Beekeepers. Ann was in the very first group of EAS Master Beekeepers that passed the exam in 1981.

What Is The BROOD Telling You?

Dewey **Caron**

An early warning sign of a bee colony in poor health can be found in the brood chamber. Colonies often "tell" us about their condition – we need to develop the inspection skills so we know what we are hearing. Fall inspection represents one of those critical times when we must monitor for colony health.

We practice "reading the frame" every time we open a colony and inspect the brood. Frame reading takes experience and skill to determine if the colony is queenright, brood is healthy and the colony is likely to expand or contract in brood/adult populations as appropriate for the season. Sometimes we can "read" the colony by inspecting two or three frames – some colonies take longer and we need to inspect additional frames to find our answers. We work to improve this reading skill every time we inspect a colony.

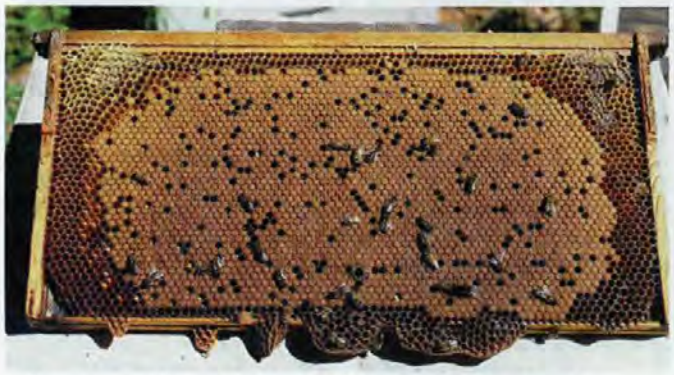
It is a "waste" of time to routinely look for a queen, although, for most beekeepers, it is immensely satisfying and reassuring when we see her. If we want to requeen we will need to find her for removal and if we are dividing we need find her as we usually want her to remain in the original colony so we can successfully requeen the new splits. But our routine inspections can supply us with the information "QUEENRIGHT" by seeing normal egg laying – the eggs "tell" us a queen was in this colony within the last three days, which is usually what we need to know to continue with our colony management.

Our basic knowledge of brood development – the basics of three days of egg development, six days of larval feeding and 12 days in capped cells (pupal stage) – equips us to become hive detectives in our colony inspection of the brood area. We also need to recognize normal (one egg per cell positioned more or less in center bottom of the cleaned cell) so we can diagnose abnormal. We should recognize the larger drone cells, where the queen will lay unfertilized eggs – we cannot tell the difference between fertilized and unfertilized eggs but bees sure do!

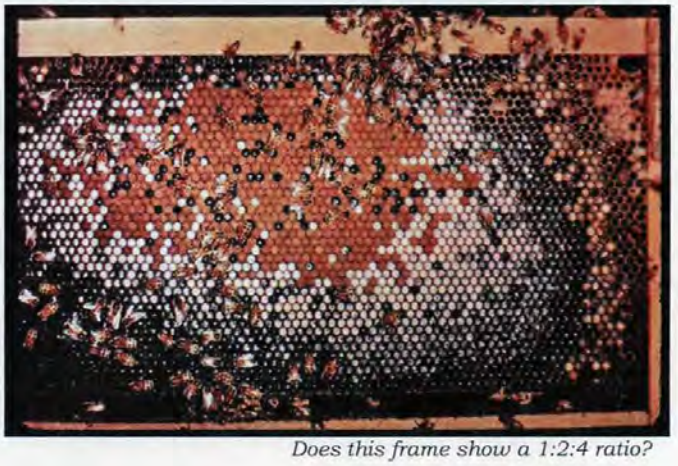
It is in the larval stage that we can diagnose the early symptoms of CCD and decline of colonies. Various authors and bee inspection personnel (in the declining number of states that still field apiary inspectors) are naming the poor brood health condition by a collection of terms. Snot brood or snotty brood (a more or less descriptive term for dying bee larvae) is sometimes used as is cruddy brood (you can google both terms for descriptions). I prefer to use the term coined in early 2000s by USDA bee scientists for this condition – BEE PMS (Parasitic Mite Syndrome).

What are symptoms of BEE PMS? Spotty brood patterns are often the first clue and then on closer examination we can see unhealthy larvae. This presupposes we are able to recognize what is healthy ("normal") larvae. We look for off color, twisted larvae. Sometimes an off-odor can be detected, even upon opening a colony in severe cases. The brood area looks wasted or cruddy and the larval remains look like . . . well you get the picture!

In both CCD and BEE PMS, poor brood appearance is duplicated in the adult population. Adult bees are "wasted" (lights on but nobody home syndrome), K-wing and crumpled-wing adults are often evident and crawling, disoriented bees seem common and populations are not robust, often too thin to cover the brood area of a prolific

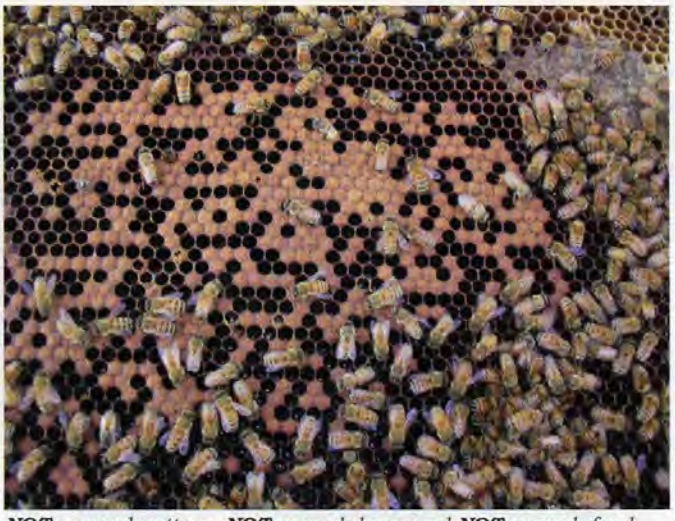


A pretty good brood pattern with healthy looking brood.



Does this frame show a 1:2:4 ratio?

Too few bees and unhealthy brood for Fall colony.



***NOT** a good pattern, **NOT** enough bees and **NOT** enough food.*

queen. Worker adults don't "look" healthy.

Yes . . . It takes practice to diagnose such subtle symptoms.

When samples are taken of unhealthy looking (dying) brood, the analysis usually comes back EFB. I strongly recommend that samples be taken and disease confirmation be obtained by sending larval samples to the USDA BEE Lab in Beltsville, MD, or a local service if one is available, for analysis. If you want more EFB details, besides the standard texts, I highly recommend you check out the eXtension site (**http://www.extension.org**) and the EFB information authored by John Skinner.

EFB is mostly manifested in uncapped brood. In addition to seeing the "classic" EFB symptoms of off-color, twisted larvae, other brood cells may have other diseases, such as sacbrood and sometimes chalkbrood but there are other individual dead/dying brood cells that defy immediate field diagnosis. Some cells seem to have a combination of both EFB & AFB, especially when a ropy test is done. Such cells especially should be sampled and analyzed for disease confirmation.

Skillful beekeepers look to see a Ratio of one to two to four in the brood chamber (for every egg, two larvae can be seen and four times the number of capped cells will be present) and a covering mantle of adult bees. Such a "read' takes skill and practice. With CCD and heavy mite damage, this ratio and the coverage of adult workers is not properly balanced. Neglect of brood may be evident, especially at the margins of the spherical brood nest. Some cappings may be perforated (an AFB symptom) but inside a developing adult will be found rather than a broken down, foul-smelling larva or prepupa.

Determining whether a bee colony is increasing vs decreasing in population is not always an easy read. Also determining the amount of honey & pollen present as appropriate for the season takes practice in evaluation. Most commercial operations equalize colonies so all the units on a pallet are more or less the same in strength. If diseased brood is present, this management serves to spread the disease condition, not contain it.

With a diagnosis of a "probable" we should then look to "solutions." However as we currently lack adequate answers as to the cause of CCD and/or poor brood appearance, our suggestions are only very general in scope. EFB can be treated with Terramycin ® or Tylan® but the EFB condition will improve once weather conditions (an external stressor) improve and a honey flow begins. Doing nothing often yields the same result as feeding the antibiotic.

IF the adult and brood symptoms are caused by a virus, nothing will immediately improve the disease situation. Standard treatment recommendations to feed sugar water and protein patties or to requeen later in the season (with the hope the new stock is less susceptible to the condition you are seeing) is always good advice. But be prepared to lose the colony too, especially in the early Spring.

If the colony is lost recommendations include airing out the frames (but still practice wax moth prevention) and culling the oldest, darkest frames. Reducing the management of equalizing colony strength, feed-lot feeding, transfer of brood from stronger to weaker colonies and combining a weakening colony with another unit are also not advisable (but commercial beekeepers will continue to do so, especially when pollination colony payment is pegged to colony strength as in almonds, seed crops and blueberries and for continuing standard management practices by hired help).

Something is affecting overall colony health and we are seeing the decline in the brood area. Skillful inspection can help diagnose declining health but we lack adequate solutions to solve our current epidemic of losses.

The brood is trying to "tell" us something but are we smart enough to hear them? BC

Dewey M. Caron is Emeritus Professor, at the University of Delaware, Affiliate Scientist - Horticulture Dept, Oregon State Univ., Corvallis **dmcaron@udel.edu** or **carond@hort.oregonstate.edu**

GLEANINGS

AUGUST, 2012 • ALL THE NEWS THAT FITS

SO WHAT ABOUT ALL THOSE AUSSIE BEES ALREADY HERE?

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 honey bees 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 honey bee 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.

– Alan Harman

NATIVE BEES US. IMPORTED BEES?

Beekeepers around the tiny Australian tourist town of Bateman's Bay face ruin after a series of targeted chemical attacks destroyed up to 1,600 hives killing millions of bees.

The hives located at several widespread sites in state forests and national parks on the South Coast of New South Wales were sprayed with poison, killing all the bees, ruining the honey and contaminating the frames and boxes.

Seven beekeepers were targeted.

One of them, Pat Roberts told the Australian Broadcasting Corp. that with so many hives targeted over a large area, often remote, the attackers must have been well equipped.

Roberts operates Rainforest Honey and supplies Woolworths, one of the two major supermarket chains in Australia. He put his losses at more than A$100,000 with the loss of 240 beehives

"They were definitely sprayed," Roberts told The Bay Post newspaper. "Yes, it was done intentionally. Yes, with malicious intent. It seems that all the larger beekeepers were hit, possibly by someone wearing a backpack spray unit who walked along spraying the entrances to all the hives."

Environmentalists are opposed to "imported" honey bees being in state forests and national parks, claiming they take food supplies away from native bees.

The state Dept. of Primary Industries and the Environmental Protection Authority have sent dead bees and swabs from the boxes for analysis to identify the chemical used.

Batemans Bay Police put the losses at A$300,000 and the state's Rural Crimes Squad is treating the attacks as a serious crime.

– Alan Harman

VSH AWARD FROM FEDERAL LABORATORIES CONSORTIUM

On May 3rd, the Federal Laboratories Consortium, an organization representing 700 federally funded labs, awarded the Technology Transfer Project of the year for Honey Bees With *Varroa*-Sensitive Hygiene Honey bees pollinate over 100 crops in the U.S., and they are extremely vital to agriculture. Unfortunately, the bees are being attacked by tiny, exotic parasitic mites, *Varroa*, which feed on bees developing inside the hive. Large infestations of mites weaken or kill whole bee colonies. To protect bees, the Honey Bee Breeding, Genetics and Physiology Laboratory developed a genetic strain of bees that is capable of fending off *Varroa* mites. The bees have a trait termed *Varroa*- sensitive hygiene (VSH), a specific form of nest cleaning behavior focused on removing the *Varroa*-infested brood. Introgressing the genes that constitute the VSH trait into previously susceptible honey bees provided resistance to the *Varroa* mite.

After the VSH trait was developed, a multifaceted approach was used to transfer the technology to the beekeeping industry. The primary means of transfer involved a Cooperative Research and Development Agreement (CRADA) with Glenn Apiaries in Fallbrook, CA, which made the technology available to other queen breeders. This in turn allowed the technology to be utilized by other honey bee breeders who receive VSH semen for breeding through Material Transfer Agreements (MTAs).

The result was that the VSH trait has been widely distributed as a publicly available breeding stock, with at least 25% of the queens now sold carrying the VSH trait.

The rapid rate of adoption is surprising to many in the honey bee industry because of the habit of beekeepers to buy the strain of queen they have always used. The value of this to agriculture is significant because of the role honey bees play as crop pollinators.

CHINESE HONEY SMUGGLER GETS FINED AND TIME

Chin Chou has copped a plea bargain and agreed to turn over everything, honey and money, confiscated with his case of conspiring to smuggle Chinese-origin honey into the U. S. in violation of Title 18 – basically, avoiding the import duty keeping the price of the product much lower than honey that was charged for the duty, or for U. S. honey which costs more to produce . . . for this he gets up to five years, with early release at three years, and a $250,000 fine and has to be very, very cooperative with law enforcement officials.

The honey was mislabeled as rice syrup, or fructose blended syrup so was not eligible to have duty collected. It was, in fact, honey. Once imported, the rice syrup labels were removed and labels declaring the contents as honey were added. The honey was sold to businesses in this country. The amount of honey confiscated came to 18,368 barrels, containing 12,122,880 pounds of product.

Taken from True Source Honey

NEW ANTIBIOTIC FOR AFB

When beekeepers utter the three-letter acronym "AFB," they're not referring to the closest air force base. Rather, they're talking about American foulbrood, a serious infectious disease of honey bees. Caused by the spore-forming bacteria Paenibacillus larvae and found worldwide, AFB is one of the most widespread diseases affecting honey bee brood, and the most destructive. The disease does not pose any health risks to people, but it wrecks havoc among bees. Severe outbreaks can weaken or kill entire colonies.

Nurse bees transmit American foulbrood by feeding spore-laden honey or bee bread to young larvae. Larvae can also become infected by P. larvae spores remaining at the base of their cells. "House" worker bees spread the spores throughout the hive when they clean out the cells of dead larvae.

Controlling American Foulbrood

The traditional control measure for American foulbrood is to kill all bees in an infected colony and then burn the dead bees and hive materials belonging to the colony. Destroying the wax comb is critical because, apart from the bees, combs are the main carriers of P. larvae spores. Burning entire honey bee colonies and their hive materials is expensive, especially considering the high cost of beekeeping equipment.

Larger beekeeping operations often turn to drugs to help control American foulbrood, giving the bees antibiotics in their feed. While the antibiotics don't kill the spores, they do prevent the bacteria from multiplying.

For decades, the only FDA-approved drug to control American foulbrood was the antibiotic oxytetracycline.4 But in October 2005, FDA approved a second antibiotic, tylosin tartrate, to control the disease. Due in large part to the work of NRSP-7,5 there are now three tylosin tartrate products approved for honey bees:

- TYLAN Soluble, sponsored by Elanco Animal Health (NADA6 013-076);
- PHARMASIN Soluble, also called TYLOVET Soluble, sponsored by Huvepharma AD (ANADA7 200-473); and
- TYLOMED-WS Soluble Powder, sponsored by Cross Vetpharm Group Ltd. (ANADA 200-455).

Both PHARMASIN Soluble and TYLOMED-WS Soluble Powder are *generic copies* of TYLAN Soluble.

The most recent antibiotic to be added to the beekeeper's arsenal against American foulbrood is lincomycin hydrochloride. In March 2012, FDA approved LINCOMIX Soluble Powder, sponsored by Pharmacia and Upjohn Co., a Division of Pfizer, Inc. (NADA 111-636). Studies to support the drug's approval were done by the Bee Research Laboratory, part of USDA's Agricultural Research Service, in Beltsville, Md., in cooperation with NRSP-7. Based on the results of these studies, FDA concluded that LINCOMIX Soluble Powder is safe and effective to control American foulbrood in honey bees w hen used according to the label.

LINCOMIX Soluble Powder is mixed with powdered sugar and applied as a dust inside the bee colony once weekly for three weeks. The bees consume the sugar-lincomycin mixture to clean the hive. During feeding, the nurse bees pass the drug to the larvae.

Similar to other drugs approved for honey bees, LINCOMIX Soluble Powder is fed in early spring or late fall before the main honey flow begins to avoid contamination of production honey. The three weekly treatments should be completed at least four weeks before the start of the main honey flow.

BEEKEEPERS STEALING BEES

A Canadian honey producer is facing a C$60,000 hit after thieves stripped 154 of his hives of their three million bees and the honey they had gathered.

Bill Termeer of Grande Prairie, Alta., tells the Canadian Broadcasting Corp. he suspects another beekeeper may be responsible for the theft.

"You would have to have pretty good knowledge of beekeeping," Termeer says. "You'd have to have the right kind of equipment to go in there and open up these hives. It just sickens my stomach," he said.

The theft was carried out over several weeks.

Alberta chief beekeeper Medhat Nasr says bee thefts are rare. There have only been five reported in Alberta over the last decade.

But Nasr expects the number to rise.

He says beekeepers that did not take care of their bees would see a sky high winter kill.

"So, either you buy new bees or look for some other sources," he says.

Termeer says it will be particularly disappointing if it turns out someone in his industry, possibly even a friend and neighbor, is to blame.

"We sort of have a code of ethics that, you know, we put our equipment out in fields and … we tend to trust each other," he says. "Often we will talk to each other if we're having problems. And so, this is really hard to understand."

Termeer tells the Edmonton Journal only one person could commit the theft and that's a beekeeper.

"It's somebody who knows what he's doing." He says. "He needs proper equipment. He needs a smoker. He needs a hat, veil, coveralls. It has to be a beekeeper."

The theft wasn't immediately obvious because the frames that were taken had been replaced with other frames that could give the impression of simply a weak hive, not a theft.

The replacement frames are different from the ones he uses, some marred with holes or nails or splashes of red paint. Others are branded by various beekeepers.

Termeer says the thief appears to be targeting his 3,000 hives and stole from one area that is hidden behind a group of trees, a location that could only be found by someone who knew the hives were there.

He says the hives that were robbed won't survive and it will probably take a year or two to rebuild them to their original condition.

Termeer is offering a C$2,000 reward for information about the theft.

– Alan Harman

ECOHEALTH FIXES FROGS, NOW BEES

Environmental group EcoHealth Alliance, a nonprofit organization that focuses on local conservation and global health issues, is expanding its research programs to include the study of honey bee health.

EcoHealth Alliance scientists are building on the methodology they used to discover the cause of global amphibian declines and apply this knowledge to study similar issues facing honey bees.

"With more than a decade of research focused on amphibians and chytridiomycosis (the fungal disease causing wide spread amphibian losses), EcoHealth Alliance is well-positioned to broaden its programs to include research in honey bee declines," EcoHealth Alliance president Peter Daszak says.

EcoHealth Alliance's team of scientists began its understanding of issues affecting honey bee health with an extensive scientific literature review focused on economic drivers, environmental factors, pesticides, pathogens, and colony management practices.

The literature review laid the groundwork for EcoHealth Alliance to identify gaps in the current research and suggest future research directions.

In conjunction with this initial phase of investigation, a survey of beekeepers and scientists was conducted to identify their knowledge on honey bee health, and gaps between perceptions of beekeepers and scientists.

Beekeepers and expert scientists from more than 20 countries were contacted and asked to participate in the survey. One of the survey's main objectives was to compare the perceptions among these groups, while also investigating beekeeper and scientist opinions on how future research should be focused to improve honey bee health.

Articles discussing the literature review and survey results are expected to be published by mid-2012 in a peer-reviewed journal as well as a beekeeping periodical.

"Our hope with this initial study is to broaden the discussion about honey bee declines and colony losses, using sound scientific evidence and new research to examine all potential causes of these issues," Daszak says.

"The future of a vital pollinating species is at stake, with significant conservation and economic implications weighing on our work."

EcoHealth Alliance is dedicated to protecting wildlife and safeguarding human health from the emergence of disease. The organization develops ways to combat the effects of damaged ecosystems on human and wildlife health.

Using environmental and health data covering the last 60 years, EcoHealth Alliance scientists created the first-ever, global disease hotspots map that identified at-risk regions, to help predict and prevent the next pandemic crisis.

It works in the U.S. and more than 20 other countries.

– Alan Harman

CALENDAR

♦INTERNATIONAL♦

ApiEcoFlora 2012 presented by Apimondia and the San Marino Beekeepers, October 4-6 in San Marino.

This is an international symposium intended to address specifically issues related to the complex relationship between bees, environment and bee flora.

For information visit **www.apiecoflora.com**.

♦ALABAMA♦

Lookout Mountain Honey Bees will be sponsoring **National Honey Bee Day** August 18 at the Attalla City park, Attalla.

The program starts at 9:00 a.m. to 4:00 p.m.Anyone can attend the event and show and sell their honey.

For more information contact David Kelton, 256.441.2887 or **honeybees60@gmail.com**.

♦ARKANSAS♦

Arkansas Beekeepers Association will their annual meeting October 12-13 at Ozark Folk Center in Mountain View.

For information visit **www.arbeekeepers.org**.

♦CONNECTICUT♦

The Connecticut Beekeepers Association and Wicwas press will conduct the **Southern New England Beekeepers Assembly (SNEBA)** November 10 at Saint Matthias Parish, 317 Chesterfield Road, East Lyme from 8:30 a.m. to 5:00 p.m.

Speakers include Jim Tew, Joe Latshaw and Larry Connor. Early bird registration is $44 or $55 with lunch received by October 22. After October 22 prices are $54 and $65.

To register or get more information visit **www.wicwas.com** via PayPal. For mailing instructions visit **www.sneba.com**.

♦NEW JERSEY♦

Beginner's Beekeeping Course October 11-13.

Mark your calendars and for more information contact Casey Noon at **noon@aesop.rurgers.edu** or 732.932.9271, ext. 606.

♦NEW YORK♦

Cornell University Master Beekeeper Program is holding **Apprentice Level Fall Course,** August 11 and August 18 at Dyce Lab, 9:30 to 5:30. $85/person. **Journey Level IPM**, August 12 and August 19 at Dyce Lab, $85/person.

For information visit **www.masterbeekeeper.org**. All classes are limited to 20 people.

♦OREGON♦

Pacific Northwest Treatment-Free Beekeeping Conference presented by Bliss Honeybees, July 26-28, **2013**. Featuring Tom Seeley and Kirk Webster.

For info visit **www.blisshoneybees.org/events.html**.

♦TENNESSEE♦

The Entomological Society of America will hold their 60th Annual Meeting November 11-14 in Knoxville.

Entomology 2012 will feature 105 symposia on insects. Aproximately 3,000 researchers, professors, students and other will be there.

For information, a full list of meeting sympsia is available at http://bit.ly/zZ4oUX. Online registration will open July 2. members of the media who would like to attend should contact Richard Levine at **rlevine@entsoc.org**.

♦VERMONT♦

EAS 2012 – August 13-17 will be held at the University of Vermont in Burlington. Bill Mares is the president.

Monday - Tuesday is the Short Course, W-F the conference.

For information visit **www.easternapiculture.org**.

♦WEST VIRGINIA♦

West Virginia Beekeepers All Conference will be held September 21-22 at Jackson's Mill 4-H Center, Weston. Main presenter Jamie Ellis.

For information contact Susan Perkins, 304.368.0813 or **wvba.susanp@yahoo.com**.

WILL CHINA EAT WHAT THEY SEND US?

The global food and agriculture market in the next three decades will be heavily shaped by Chinese preferences, needs, and developments, a report from the U.S. Grains Council predicts.

It says that as China develops its food and agriculture system and the supporting infrastructures – and as its growing income boosts food consumption – the country's influence in global markets will be far-reaching, well beyond the impact of market size alone.

"It will shape and redefine global agribusiness, biotechnology, food processing, logistics, and trade – increasingly from a position of strength," the report says. "The expansion of China's commodity exchanges, likely in partnerships with exchanges in developed countries, will further increase global sensitivity to developments in China."

The study, called Food 2040, predicts a wide variety of potent, interacting forces will drive the food system in the developed and developing nations of East Asia over the next three decades

"East Asia is on a path to global leadership in bioscience, driven by huge investments and huge food needs," the report says. "Consumer doubts about biotechnology may be swept away by necessity, as the region seeks food security and more sustainable agriculture that can help alleviate resource quantity and quality constraints – needs that are arguably most acute in China."

It says East Asian markets will belong to suppliers whose customers trust them because they can demonstrate the safety, quality, and identity of their food. Trustworthy products will command a substantial price differential. Much of East Asia will have state-of-the-art food safety and security systems offering transparency throughout the supply chain.

"To build this system of trust, East Asia will adopt effective regulations, develop and implement new food safety technology and systems, implement traceability and transparency, and improve enforcement. As a result, overall food safety and quality will improve.

China, by participating in the system of trust, the report says, will gain entrance to the global food and agriculture network.

"As the system of trust grows, consumers will be able to move past safety concerns to choose foods based on other values and preferences," it says.

The report says by 2040 more than 70% of food in Japan may be prepared outside the home.

"As a result, food will shift from being a product to being a service," it says. "Consumers will rely on trusted brands, stores, and foodservice outlets for most of their food, most of which will be processed or pre-prepared. Japan will serve as a bellwether, as this trend will spread to other parts of urban East Asia.

"The entire food system, from farm to fork, will be impacted by the shift away from home cooking. Successful food-industry players will be those that anticipate and adapt to a market characterised by intensified competition; a shift away from ingredients and toward brands, retailers, and restaurants; far greater diversity of consumer tastes; and continuous technical innovation."

The report predicts restaurants, food service chains, convenience retailers, and other outlets will become consumers' primary interface with the food system.

A proliferation of specialty and value-added foods and ingredients will form a growing share of East Asian agricultural consumption.

"Driven by rising incomes and increasingly sophisticated tastes, East Asian trade and consumption will marked by 'nichification,' creating opportunities for production and distribution of specialty products," the report says.

Although growing demand for meat in Asia will continue to fuel demand for bulk grains, it says new specialised grain products will dominate future long-term agricultural trade growth.

Agricultural crops will increasingly be identity-preserved to segregate the various streams of higher-value crops by nutrient enhancement, organic production, and myriad other traits. East Asia will develop an advanced intermodal logistics system to monitor and transport the specialty grains needed to satisfy consumers' demand for specialty and niche food products.

"The next 30 years will offer great opportunity to expand agricultural production to support greater demand growth for meat, dairy, vegetable oils, fruits and vegetables, fish, and other food products," the report says.

This prosperous future will be driven by increased consumer purchasing power, growing population, and diets becoming richer in protein, fat, and less dependent on grain or root-based carbohydrates.

The report says China's quest for food self-sufficiency will continue, but its reality includes very significant dependence on global markets. These competing visions will shape its trade, biotech, and environmental policies internally—and, increasingly, internationally.

Asia's investments in farmland beyond Asian borders continue despite controversies. These include South Korean investments in Mozambique, Japanese investments in Indonesia, and Chinese investments in both Africa and South America.

"In Ethiopia, the Chinese are building roads and putting mobile phones into the hands of many farmers," the report says. "According to one expert, the Chinese call these farmers on their China-supplied mobiles in order to check on their production, then buy up the crops before they go to market."

Display Advertisers

At the Colorado Beekeepers Summer meeting at Paul's place in Silt, the neonicotinoid controversy reared its head. In case you're new to beekeeping or haven't been paying attention, California bee guru Randy Oliver is challenging the Harvard study that links systemic pesticides used especially on corn and canola with Colony Collapse Disorder (CCD). The Harvard study hit the press in a big way. Virtually every kernel of corn planted in this country is dipped in the neonicotinoid chlothianidin, and with record high prices, corn is king.

We have advocates on both sides in our association, two in particular. Both are dedicated longtime members. I consider them friends. They both know a hundred times as much about bees as I do. One skipped the meeting.

Now I'm all in favor of controversy. But the rhetoric here is a little shrill. This is starting to sound like Republicans and Democrats. We beekeepers can (and should!) disagree, but let's all shake hands and have a beer together afterwards!

You can't go to this meeting without learning something. Rubbing elbows I got the name of a California queen producer who comes highly recommended. Another fellow beekeeper told me why he re-queens with cells and where he buys them.

Even though I used to work for Paul, I went along on his honey house tour anyway, because I know where pearls of wisdom are to be found.

Beekeeper and California almond bee broker Lyle Johnston reminded us how important it is to beef up your bees with pollen substitute, but just before that, sixth generation (clear back to the old country!) beekeeper Tom Haefeli told us he's tried pollen substitutes and that they didn't make a difference! "We decided to just let bees be bees," he said.

A difference of opinion between friends! Great!

Up on the Flat Tops, I have a yard at 9,000 feet at a place called the Lettuce Patch. This is a tiny island of private land in a sea of national forest. Long ago it really was a lettuce farm. They shipped their produce to New Castle in wagons.

When I went to the Lettuce Patch yesterday, the little darlings stung me twice before I could open the gate to my solar electric bear fence. The bees can be so testy on the Flat Tops. I have no idea why.

I also have no idea why they were on a honey flow. It's bone dry. The mid-June wildflowers look ready to wilt. We've been in a drought for months, and our Winter snowpack was dismal. When the occasional car drives by, dust clouds roll.

This summer I have a persistent haunting fear – fire. I once saw what a cheat grass fire did to one of Paul's yards. You wouldn't even know there had been an apiary there. All that were left were a few metal hive parts.

The new honey is water-white. I find dwarf waterleaf scattered through the open meadows and even in the timber, but never very much of it. The bees must have their secret stashes.

One thing I find intriguing about beekeeping are the constant surprises. I drive to the Flat Tops expecting to be feeding bees and wind up putting on honey supers! I anticipate scraping drone brood in the second storey of my brood supers to get rid of *Varroa* mites, and find those combs almost universally packed with honey! Why is it that this year the bees are content to rear brood in the bottom super and pack the upper with honey, when the queen could have a two-storey brood-rearing mansion? Is this related to the pollen dearth?

Flowers need water to grow and to produce nectar, from which bees make honey. But I saw good honey production on the Flat Tops yesterday. I've seen this before in a drought. On Aspen Mountain – also desert-dry – I'm feeding bees right now. I'm keeping them alive with that fermented honey I told you about last month.

Normally my Flat Tops bees bring in a lot of pollen. With or without a honey flow, they pack in the pollen. This year their pollen stream is a trickle. I turned off the traps, and now I wonder if I should supplement their pollen during a honey flow. This would be a first!

I think I have a handle on my *Varroa* mite numbers, but what did I just say about surprises?

As I leave the Dodo yard on the Flat Tops, the Beatles' Yellow Submarine plays on the radio. A gentle breeze blows the dust away from the truck. Wild geraniums, vetch and columbines bloom along the roadside. Mother and Father Grouse herd their children into cover as I approach. The sun is setting. Maybe it'll rain, someday.

Little Darlings Maybe It'll Rain Someday

Ed **Colby**