Nov 2009
Bee Culture
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CATCH THE BUZZ

INSIDE . . .

ROOT PUBLICATIONS
$4.99

The First Bees wrap up the seasons this month with a healthy harvest and distinguished customers. Read about the White House Bees on page 42.

Honey photo by Charlie Brandts
Container photo by Carmen Salazar & Caleb Siemon

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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. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), November 2009, Volume 137, Issue 11, 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.

Contact Information, Book Orders

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

Advertising

For information on advertising contact Dawn Feagan at 800.289.7668, Ext. 3220; Dawn@BeeCulture.com

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

Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

NOVEMBER 2009 VOLUME 137 NUMBER 11

FEATURES

Reliable Info

I'm writing to comment on your joint project with the web page published by Hearst Publications called **www.thedailygreen.com**. Your blog on that web page for the last two or so years called The Beekeeper has been one of the few reliable sources of information regarding Colony Collapse Disorder and I have appreciated the fact that tdg publishes it for those of us who are following the progress of the researchers. Now, your newest project is another winner in my opinion soliciting photos and short stories from beekeepers who keep their bees in an urban environment. So many people have begun keeping bees in the past couple of years live in that environment, but unfortunately there are so few existing resources in many cities, that they have no one to turn to. I applaud your gathering together this community of City Beekeepers, and I urge anyone who keeps bees in any kind of urban setting to participate in this project. As you state in your appeal ... share what you do with those who can share with you. We are a community, and we need each other

Gordy Fawcett
Medina, OH

The Science of BC

As a subscriber to only *Bee Culture* and no longer a subscriber to the *ABJ* I find *The Science Of Bee Culture* a useful addition that makes the magazine more well rounded.

It was always a better read than the *ABJ* and this makes it also its equal in scientific presentations. Keep up the good work.

Howard Kogan
Stephentown, NY

CCD And Leaf Blowers

Could leaf-blowers be a cause of honeybee illness? I have studied the effects of the machines on the environment for two years. They inflict 90mph winds into soil, grass and undergrowth at a range of 10 inches, and release very strong fumes. 2.6lbs of dust are blown up each hour containing: moulds, pollens, powdered animal feces, carbon, lead and a range of microparticles. Might bees easily pick up new spores and germs which infect their hives?

Meanwhile, winds of 90mph (a figure admitted by the manufacturers) damage plants, flowers and shrubs. If growing they are impaired structurally, while in general deprived of mulch, nutrients and soil moisture; but what are the effects of frequent wind-violence on pollination? Surely this cannot be encouraging for bees.

I cannot understate how prevalent the machines have become in the past two years. They are used every month of the year in almost all public and private green spaces: parks, woodlands, meadows, playing fields, golf courses, gardens – anywhere anything grows, and where bees like to forage. This is the first time the petrol engine has been introduced to many of these places, and they are very rudimentary engines, with intense emissions. Average duration of professional use is 30-45 minutes. In larger public spaces, it can last over a single day

If you'd like to research further typing 'leaf-blower harms' into Google brings up 68,000 web pages, including research findings from those regions where blowers are illegal

Is it just coincidence the sharp declines of bees, (and here in Europe: butterflies, bugs, and birds which eat these bugs), have all taken place at the exact time blowers have become mass market?

S. MacReynoldson
London, England

What's In Megabee?

I just got a package of the Megabee Tucson diet, after weeks of fruitless searching for organic pollen substitutes for my bees... decided something was probably better than nothing, this year ... however, I was disappointed to find that there is no ingredient listing on the package, and when I tried to research it on the web was informed it is "proprietary " Part of this product was funded by the USDA, and the research to develop the product was done in conjunction with them, using my tax dollars

yet, no where on their website can you find out what's actually in the stuff I like to know what I'm giving my bees, and I'm very careful and off the wall fussy how can beekeepers be feeding their bees something they have no idea what it actually is? Does anyone know what it is? What's in it that could be so questionable that no one can know what it's made of? I don't want to start manufacturing and selling it, I just want to know what I'm feeding my bees why the big secret does it have something to do with some chemical(s) that many beekeepers might not find so agreeable(?)

Ariane St. Claire

Utah Not Bee-Friendly

I was just reading through the "Catch the Buzz" emails I have received and noticed the August 17th edition (**home.ezezine.com/1636-2009.08.17.52.archive.html**) entitled, "Celebrate Urban Bees." Not so in the rural city of Hyrum, Utah (the Beehive State) – population about 7500 people, almost as many cows (that's what you smell as you drive in), and not nearly so many beehives (**www.hyrumcity.com**). I am a very small, very busy side-liner I work nights to make ends meet. With what time isn't spent between work and family, I run around to my 30-or-so hives and try to make sure everything is going well. I don't have much time for the busy city bureaucrats who want to regulate every square foot of Hyrum.

Here's my story· Last Summer, I started a business and bought 50 nucs. Most were doing well going into the Fall. I didn't know the best

place to overwinter them, but I wanted them close, so I put them in my garden. I live on .38 acres .42 if you count all the area within my fence. I certainly didn't plan to leave them all there, so come Spring I was trying to find placement locations and some time to spread them out. With a handful of Winter-kills and about a dozen that succumbed to the cold, wet Spring, I placed about half of what remained in interested neighbors' backyards, leaving about 15 of the strongest in my garden. I wanted to make splits of my strongest hives, but was looking for a convenient, near-by location.

The crux of the issue is that I live on the same block as Hyrum City's Soccer Fields. (My back (chain-link) fence collects all the wind-blown trash off the field's parking lot; and my apricot tree and grapes are an attraction for after-soccer loiterers to climb and steal.) Hyrum City planted maple trees all around the soccer field. Good for honey bees when the maples are in bloom. There were no complaints of being stung, but according to Hyrum City Zoning Administrator Ron Salvesen, there were "multiple complaints" that there were "too many bees." If they were my bees, buzzing in the trees, doing their thing, they were well above the heads of the soccer fans.

Mr Salvesen must have seen hives in my backyard and paid me a visit. I was asleep at the time (working nights isn't always the most social), but my wife relayed the message. Since beekeeping is my business, Hyrum City dictates that I need a home-occupancy business license. Okay I went and applied, thinking that was the right thing to do, even though Mr Salvesen said the application probably wouldn't be approved. I learned soon after that since beekeeping falls under "agricultural" like farmers and dairymen – beekeepers aren't required to have a business license, but they are licensed with the Utah Department of Agriculture and Food. (My license number is 20345 and has been for four years.) But, I paid the application fees, a part of which was non-refundable. The application was denied, but I haven't heard anything else. Perhaps I'm learning the hard way, but I'm busy and haven't done any follow-up.

Then recently, I heard through the grape-vine that Hyrum City had a meeting to discuss beekeeping. Curious, I searched through the agendas on Hyrum City's website to see if there was any truth to the matter There was a meeting last month. I guess I was invited, but I'm sure I was at work. They decided to update their ordinance on the keeping of animals to include beekeeping. Basically, the law states that you can't have a hive of honey bees unless you put it on .505 acres (22,000 square feet). If you happen to have that space, you can have three hives, with an additional hive for every 10,000 square feet, with a maximum of six hives on a city block. So, even if you had the whole block of roughly 14 acres, you could only place six hives. And you must place them 90 feet from your neighbor's house, 45 feet from your own house, and 45 feet from your property line. Goodbye garden hive. Goodbye hobby beekeeper (My wife will be happy – I guess I can't put an observation hive in the bedroom.)

The whole situation makes me angry Thank you Big Brother Hyrum City bureaucracy and City Council. Born of what appears to be ignorance and fear, a reactionary bureaucracy wants to kick managed honey bees out of Hyrum City (You should also know that there is no shortage of wasps – of every stripe – in this city Stop by and I'll show you a huge paper-wasp hive in one of those maple trees.) So, either I find every nook and cranny in Hyrum not filled with a cow, or I pull out. I'll start doing the follow-up and contacting those city councilmen, but it looks to me like a time-consuming, uphill-battle full of irritation, and I'm spent for time, money, and energy

Thanks for the listening ear

George N. Bryan
Hyrum, UT

Storing Honey Supers

I tried something that seems to work without using chemicals. For the last two years, I've placed stored honey supers on a screened bottom board and on top of the supers placed a box fan so that the air is pushed down thru the supers and out of the screened bottom board. It seems the air movement stops the growth of the wax moths and as an added benefit keeps the garage smelling like honey

The box fan is one of those slender fans, approx 20"x20"X4" that you can get at Wal-Mart for about $15. I stack the supers (mine are all mediums) six or seven high over an elevated (about 4" off the floor) screened bottom board. I place, directly on (over the top super) the fan so that its lying on it its side, pointed down into the supers. The fan forces the air down thru the supers, out the bottom and keeps the wax moths at bay

I let it run all the time (have not tried turning it off & on periodically) and I've no idea on energy cost. I'm guessing negligible as I don't notice a difference on my monthly bill. Note though, that I've only four stacks of six or seven supers (just a hobbyist).

Just thought others might try to see if they have the same results.

Larry
South Carolina

Strange Bee Behavior

I'm not a beekeeper yet, but hope to be in the future.

I have a question about some bee behavior, and wondered if you or any of your readers might know the answer

This Spring, I noticed honey bees were very interested in a five gallon bucket of urine-soaked charcoal. (I'm sure that sounds icky Its one ingredient of terra preta.)

There were always about 15 bees on the charcoal. They would land on it, crawl around on it for a while and then take off. New bees were always arriving.

The charcoal had a strong ammonia smell and the top layer was damp. The bees were exploring all the crevices of the charcoal with their probosces. The only other visitor to the bucket was a moth.

This behavior continued for two

weeks, until I had to cut it short by actually using the charcoal as the bottom layer of a raised garden bed.

There was a very light film of ash on some of the charcoal, which I know is high in potassium. Urine of course is high in nitrogen.

Any idea why the bees were attracted to the charcoal?

Kristina Z.

Editor's Note: *You pretty much hit it on the head. The bees were chasing the minerals and other nutrients available. You will often see bees drinking water from hoof print holes in stockyards – imagine how that must taste – for the very same reasons and sometimes you will see bees on stock salt blocks for the very same reasons. Good luck with your beekeeping and don't hesitate to ask if you have more questions.*

Honey Bee Awareness

We would like to say thank you to all those who supported National Honey Bee Awareness Day on August 22, 2009. The National Honey Bee Day program was supported by many individuals, organizations, and folks at *Bee Culture*. The camaraderie and excitement generated no doubt benefited all who participated in many ways. It is hard to imagine how many new beekeepers were introduced into beekeeping.

There were 15 states and 39 bee associations that took part in the day's events. Presentations and programs were aimed at educating the public, expanding the bee industry by signing up new members, and getting others involved. Local, regional, and national news picked up on the event and it was a day for beekeepers to shine in so many ways.

The day was formally recognized on August 11, 2009 by the United States Department of Agriculture with a proclamation, and signed by the Secretary of Agriculture, Thomas J Vilsack. Tina Bowen and her son Zeph, from Terre Haute, Indiana, were instrumental in getting this accomplished and they are to be commended for their efforts.

Plans are now underway for the next National Honey Bee Day for this coming year We invite all beekeepers and associations to get involved, and come together in promoting the very industry we all love. A list of this years participants, details about National Honey Bee Day, as well as other information can be found at **www.nationalhoneybeeday.com**

We can not say it enough, Thank you to all who participated. This started as a simple idea and quickly grew We look forward to many more positive returns for the bee industry as we move forward in the future.

Mike Thomas
Lewisberry, PA

Wintering Beehives

James Tew's article "Wintering Beehives" (**www.beeculture.com/storycms**) (part 1), took me on a very welcome journey down memory lane. I began beekeeping in the Spring of 1941 in northern Dauphin County PA and therefore have lived and kept bees through most of the time period he covered. In the second sentence of the paragraph "Winterizing Colonies" James Tew states, "On many occasions, I have wondered why that recommendation [colony packing] passed into obsolescence." The answer is "The packing, and later the wrapping, did not work."

The product was not at fault, it was the brood chamber's excessive moisture problem that was aggravated by packing the hive or using hive wraps. Later, the problem was compounded by the "Chimney Effect" created by our subsequent ventilation methods employed to reduce moisture within the brood chamber

In the Fall of 1941, I packed my single colony in accordance with the method typically used in our area. The brood chamber (one or two full depth supers) were protected on the East, North and West sides by placing layers of straw tight against each side. The South front entrance side was left uncovered. The only brood chamber opening was the one inch long by one quarter inch high reduced entrance of the solid bottom board. The entire straw packing and hive assembly, except for the reduced entrance opening, was covered with a layer of "Tar Paper" (tar impregnated felt paper – roofing material). The entrance opening was left open. All the moisture was trapped in the hive, therefore Winter losses were heavy In the Spring, it was quite common to find major ice deposits inside the hive often completely blocking the entrance opening.

By 1943 the majority of beekeepers, realizing the packing method was not working, began experimenting with various wrapping materials at hand. We also began drilling ventilation holes through the hive body to reduce the moisture. The entrance opening was enlarged which required it to be covered with galvanized wire hardware cloth for protection against critters. Various styles and mesh sizes were evaluated, eventually leading to the ½" x ½" mesh size being the common selection. Because of the war effort (WWII) our choices of wrapping materials and wire mesh screen sizes were extremely limited. Unfortunately, the advent of the ventilation holes through the hive body walls created the "Chimney Effect."

The chimney effect is the movement of air through the brood chamber as the warm air rises and exits through the upper ventilation holes while being replaced with cold air being sucked in through the bottom opening. This constant air movement bypasses any exterior insulating devices rendering them useless. An analogy would be if you perfectly insulated your house and then left all the windows open during cold weather for fresh air

After WWII (1946), when beekeeping supplies and shipping became more available, I spend a lot of time drilling holes and testing most of the various hive wraps that had begun to show up on the market. Over the years, none of this effort was successful.

In 2005 (May), I installed the first of my Screened Open Bottom board units which solved my *Varroa* mite problem and partially solved

my moisture problem.

In 2007 (Oct), I began using my first Dead Air Space. All the hive ventilation holes and openings, except for the large opening of the open bottom board, were completely closed. That reduced the moisture to a comfortable level and eliminated the chimney effect.

It was now time to re-evaluate hive insulating methods and devices.

In 2008 (Oct), I began gathering research data. The following hive configurations were used for this task. All hives were equipped with my recommended "Screened Open Bottom Board and Dead Air Space."

1 Standard wooden 10 frame hive without insulation wrap.
2. Standard wooden 10 frame hive with ¼" plastic hive insulation wrap.
3. Polystyrene 10 frame hive without insulation wrap.
4. Polystyrene 10 frame hive with ¼" plastic insulation wrap.

The preliminary data show that the various methods of insulating the hive do work quite well (when using the test hive configuration). My research project will continue this year and will include comparison data for the standard 10 frame wooden hive covered (painted) with just "Ceramic Insulating Paint." My preliminary studies this summer showed the ceramic insulating paint, when combined with the screened open bottom board and dead air space, to be quite promising as a stand alone insulating medium.

Note: Additional information concerning ceramic insulating paint is available by contacting the manufacturer in Melbourne, FL. Email: www.hytechsales.com/questions FAX: 321.984.1022

Thank you James for the very informative article. I appreciate the time you spent organizing and condensing such a voluminous mass of information. I'm looking forward to perusing part 2 and 3.

John G. Hoffman
Mt. Holly Springs, PA

Swarm Hive

The photo is of a hive built by a swarm this year underneath one of my screen bottom boards. This hive also had a Sundance pollen trap on it all Spring and Summer I discovered the hive when I was taking honey off and was in the process of moving the pollen trap to another hive. My hives sit on eight foot timbers about four inches high, which are also sitting on small concrete blocks. So, there was plenty of room under the hive.

The bees were gone when I discovered the hive.

A commercial beekeeper suggested that it might have been a virgin queen that could not get back in the hive after she was mated. I don't know why they left after being there long enough to build all this wax.

Larry Hensley
Florissant, MO

Business For Sale

Hi everyone,

We recently put our business up for sale.

You can get to the site from our regular web site www.purvisbrothersbees.com via the "BUSINESS FOR SALE" link or to the home page of the sale site http://web.me.com/dannpurvis/Purvis_Brothers_Bee_Business_For_Sale/Welcome.html.

We wish you all the best. We will be downsizing-not going away Our plan is to get more into practical beekeeping research and to maintain the Goldline bee. We will probably be offering breeder queens as well as a small number of tested production queens, consultations, and seminars.

Please pass the word.

See you around and thank you,

The Purvis Crew
Leoma, TN

Beekeeping In Chinese

I have enjoyed the *Bee Culture* magazine since we started keeping bees this year I find the magazine very educational and enjoyable to read.

I hope you can help me find a basic beekeeping book written in Chinese for my husband. I do not speak Chinese. He wanted the bees but he doesn't read English very well and he doesn't understand why we are feeding the bees & dusting with powdered sugar and the other things I check for in the hives. For just starting this year, our hives produced 1½ supers of capped honey and five frames of uncapped honey that I gave back to the hive.

If you have any Idea where I can order a basic book in Chinese for him I would really appreciate it. I have talked to the Chinese book store here and they look at me like I'm crazy My son hasn't had any luck in San Francisco Chinatown.

Alvalea Fong
Oregon City, OR

INNER COVER

If you haven't already, read that article on page 43 about those Asian bees in Australia. The article is by Doug Somerville. If the name sounds familiar it is because he's the author of the *Fat Bees/ Skinny Bees* book that set the standard for honey bee nutrition. He's no slouch when it comes to honey bee biology, and he has some concerns. Go ahead and read the article. I'll wait.

When it was first suggested bees from Australia be allowed into the U.S. there was a lot of fuss and bother ..some of it mine. .about letting them in. The inspections weren't as careful as we would like, it was said, and what unknown diseases could get in, we asked. But so far nothing's happened and those fears appear groundless. So now we import both honey and pollination. .food production has been outsourced even more.

But a couple of years ago a cute little *Apis cerana* colony stowed away on a boat and got into northern Australia from a nearby island, *again*, and started expanding. It swarmed and it swarmed and the swarms swarmed. Diligent efforts have so far not been able to eliminate all those swarms and all the swarms from the swarms, and those who are looking just keep finding new nests, further and further away from the initial colony (see the article on this in the June, 2009 issue).

After a year of this USDA APHIS finally had to pay attention to the problem because of all the package business Australia was doing up here. And there was that pesky ruling in the trade agreement that said there couldn't be any other bees in Australia if they wanted to ship bees to the U.S. or something, so APHIS had to actually go look. It wasn't the bees they were worried about though. Rather the mites they thought might be coming in with the bees. So far, none have been found.

But because they couldn't get rid of the bees APHIS simply changed the rules. These new bees were told to stay at least 200 miles from any Australian package producers. And the mites? Well, it seems that, though *mostly* on the giant honey bee *Apis dorsata*, *tropilaelaps* mites sometimes ride along on *Apis cerana*, along with their *Varroa* cousins, so those of us who kicked up a fuss back then weren't completely wrong. And now there's a new varroa mite on these same islands that these *cerana* colonies came from that is as nasty as the old *Varroa* mite we know and love...so getting mites we don't want, two new mites we don't want in fact is a very real possibility from those bees, now from Australia.

But mites aside, the article this time adds a whole new layer of bad news. In head to head competition these little beasties actually out-compete our bees in the foraging and swarming departments. They have a temper you don't want in your bee yard or anywhere else near where you are, and they don't produce enough honey to bother with. When it comes to us or them...they blow European bees out of the water No contest. And they aren't even as big as our bees. .go figure.

What is most telling is that beekeepers in Australia don't want this bee in Australia for all these same reasons. These bees are just plain no good.

But they're so much smaller, you say You can tell them apart. .look at the photo...easy enough, right? When they're side by side, sure, it's no problem. But who is doing that not-so-thorough inspection down under, just before they get on the plane? Remember, they do virus inspections visually, according to the rules, and *we* can't inspect them there because it wouldn't be friendly It'd be saying we don't trust their inspections. It wouldn't be nice.

What's worse, we can't inspect them before they get off the plane *here* because it hinders trade (which makes one wonder about the "absolutely no foreign bees in Australia" when the rule first went up, that got changed to the "200 mile rule" by decree rather than science when it was evident the old rule was plainly flagrantly being broken). So who's to say some of those packages aren't *cerana*, and not *mellifera*? The Australians, who are selling us packages; or APHIS, who changes the rules they can't enforce?

I already know the argument here. .of course U.S. beekeepers know the difference and would spot those bees immediately They will be our last and best defense. And they'll spot those little critters right after somebody dumps them in a hive. There's an old saying about barn doors that keeps cropping up here, isn't there.

Well don't worry, be happy, it's OK. Both Australia and APHIS tell us there's at least a 200 mile barrier, way more than 200 miles in fact, between where those bees are in Australia and any package producers in

Continued on Page 78

Are Australian Bees Still Safe?

NOVEMBER – PRICE REPORT & 2009 CROP ESTIMATE

Time again for *Bee Culture's* annual honey crop report. We poll our 100+ reporters each Fall on crop conditions for the Spring, Summer and Fall crops in their regions, overall crop for the year, and colony production for the season on all colonies…not just those that produced honey.

Our track record for this report is pretty good as far as predicting colony performance each season, and, using some intuitive data, plus talking to a lot of beekeepers during the course of the season we get a handle on the number of colonies out there.

Last year USDA counted 2.301 million colonies producing 69.9 pounds of honey each…we figured there were 2.564 million colonies producing 60.7 pounds of honey each. That turns out to be about a 5 million pound difference in the total crop, or a 3.1% difference…we're not sure who's numbers are off… We're pretty confident in ours.

Nevertheless, our predictions this year are quite glum. It has been, in most parts of the country, a horrendous year for honey production. Foul weather most of the season dampened nectar production, flight time and crop yield. Take a look at the individual regional statistics for the local bad news.

Overall, each crop was lower than last year's, fewer people harvested crops overall, and the general feeling was that pretty much the season was below average.

Our colony estimate for the crop year of 2009 is 2.223 million colonies, down 3% from last year's USDA count and 13% from our estimate last year based on our interviews and other factors. Average yield per colony, over all regions is 53.7 pounds per colony…down 25 % from USDA's count last year, and down 12% from our estimate last year.

These figures calculate to an overall honey crop in the U.S. this year of 119.375 million pounds… perhaps the lowest estimate of a honey crop ever.

This will, undoubtedly, lead to significant increases in imports to meet demand, and, with available overall global honey on hand at best average, there will be some, probably dramatic price increases.

If you have honey in a tank somewhere this Fall…guard it carefully, and sell it cautiously.

R = Crop Rating
% = Reporters in that Region harvesting Spring, Summer or Fall

R	%
3.6	75

3.6% = crop rating, somewhere between average and not too bad.

75% of Region 12 reporters harvesting the Spring crop

R = Crop rating: 1 = Very good; 2 = Pretty good; 3 = Average; 4 = Not too bad; 5 = Very bad; A = Average

Regions	1		2		3		4		5		6		7		8		9		10		11		12		*All Regions*	
Crop Harvest	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	Avg	%
Spring	5.6	33	4.5	38	4.4	80	3.0	88	2.0	100	3.2	100	3.8	88	1.3	100	4.3	66	3.0	100	4.8	50	3.6	75	3.6	76.5
Summer	5.3	66	3.9	80	4.0	80	3.6	88	4.5	50	3.7	89	5.0	63	2.7	100	4.3	66	3.0	100	3.9	88	3.9	71	4.0	69.0
Fall	4.3	66	4.0	62	6.0	0	4.0	55	6.0	0	3.4	77	4.0	50	6.0	0	6.0	0	4.8	75	4.1	70	4.7	43	4.8	41.5
Avg. lbs./col	30.0		37.4		37.3		32.8		70.0		72.4		31.8		56.7		82.7		57.0		53.6		83.0		**53.7**	
Overall Crop Rating	5.0		4.6		3.5		3.6		2.5		2.8		3.9		2.3		3.6		3.0		3.4		2.9		**3.4**	

REPORTING REGIONS

	1	2	3	4	5	6	7	8	9	10	11	12	SUMMARY Range	SUMMARY Avg.	History Last Month	History Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.50	1.65	1.58	1.59	1.53	1.60	1.51	1.75	1.40	1.55	1.49	1.55	1.40-1.75	1.56	1.41	1.46
55 Gal. Drum, Ambr	1.49	1.55	1.49	1.43	1.45	1.43	1.48	1.75	1.30	1.49	1.45	1.43	1.30-1.75	1.48	1.22	1.33
60# Light (retail)	220.00	138.00	130.00	127.25	120.00	142.00	121.38	115.00	135.00	118.57	141.00	140.00	115.00-220.00	137.35	137.02	122.92
60# Amber (retail)	220.00	128.33	130.00	125.25	120.00	127.50	139.00	130.00	100.00	151.06	132.00	153.15	100.00-220.00	138.02	128.44	116.49
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	52.08	55.72	45.60	43.50	70.83	54.00	59.07	70.83	70.83	45.36	48.27	87.53	43.50-87.53	58.64	59.07	56.95
1# 24/case	71.04	77.98	72.00	65.00	76.00	83.60	75.52	90.00	62.50	97.44	79.16	93.00	62.50-97.44	78.60	76.46	79.91
2# 12/case	69.00	72.84	66.60	60.00	69.00	66.30	69.16	78.00	59.00	75.00	62.10	79.00	59.00-79.00	68.83	62.45	71.81
12.oz. Plas. 24/cs	72.00	69.10	50.40	75.25	60.00	70.00	60.90	76.20	52.00	56.40	64.55	70.00	50.40-76.20	64.73	65.02	63.34
5# 6/case	75.04	82.55	78.00	70.50	80.86	90.00	73.16	96.00	72.00	70.20	75.35	86.67	70.20-96.00	79.19	72.83	74.32
Quarts 12/case	80.82	111.54	93.01	116.67	96.00	91.57	93.76	95.00	111.75	83.97	82.35	114.00	80.82-116.67	97.54	103.37	102.31
Pints 12/case	71.75	61.48	71.75	71.25	60.00	51.67	79.90	62.00	78.00	56.70	52.47	65.33	51.67-79.90	65.19	65.61	62.01
RETAIL SHELF PRICES																
1/2#	2.75	3.08	2.83	3.48	3.99	2.75	2.86	3.50	2.99	2.75	3.27	5.00	2.75-5.00	3.27	3.29	2.99
12 oz. Plastic	4.00	3.81	3.73	3.93	4.00	3.85	3.39	4.25	3.40	3.36	4.62	4.41	3.36-4.62	3.90	3.77	3.74
1# Glass/Plastic	4.63	4.44	5.04	4.81	5.16	4.72	4.27	5.13	3.70	4.74	5.20	5.15	3.70-5.20	4.75	4.70	4.73
2# Glass/Plastic	8.75	7.61	8.93	7.20	8.75	7.32	7.47	8.50	6.43	7.97	8.90	9.75	6.43-9.75	8.13	7.83	7.46
Pint	7.92	6.28	7.92	6.64	6.50	6.38	7.57	6.48	9.00	7.47	8.04	9.00	6.28-9.00	7.43	7.29	6.45
Quart	11.47	14.47	11.75	10.56	10.75	8.49	10.81	10.08	11.00	14.73	11.00	14.75	8.49-14.75	11.66	11.42	10.90
5# Glass/Plastic	17.00	15.82	21.98	16.85	21.72	19.00	16.82	18.00	18.00	15.12	20.16	19.75	15.12-21.98	18.35	17.30	16.99
1# Cream	5.69	5.80	6.50	5.75	5.69	5.50	5.19	6.39	3.29	5.55	5.86	6.91	3.29-6.91	5.68	5.49	5.10
1# Cut Comb	5.50	5.71	6.50	6.33	6.94	5.83	7.33	6.00	6.94	8.00	7.50	8.50	5.50-8.50	6.76	6.84	6.84
Ross Round	6.98	4.65	6.50	4.75	6.98	6.50	7.25	5.25	6.98	6.98	7.00	7.95	4.65-7.95	6.48	5.73	6.11
Wholesale Wax (Lt)	2.50	3.92	2.50	3.17	2.15	5.50	3.60	4.00	3.35	4.43	3.13	3.90	2.15-5.50	3.51	3.47	2.93
Wholesale Wax (Dk)	2.50	3.48	2.50	2.96	2.00	4.50	3.50	4.00	3.19	3.19	3.08	3.25	2.00-4.50	3.18	3.67	2.65
Pollination Fee/Col.	80.00	86.67	67.50	42.75	150.00	65.00	51.40	60.00	89.73	89.73	65.00	125.00	42.75-150.00	81.06	72.60	73.77

A Closer Look

THE MYSTERIOUS DUFOUR'S GLAND

Clarence Collison

Some speculation still surrounds the precise role of the Dufour's gland.

The Dufour's gland is found in all female hymenopterans (bees, ants and wasps) and it is believed to secrete compounds that are utilized in defense by workers and reproduction in queens (Martin et al. 2005). In the worker and queen honey bee, the gland is associated with the sting apparatus and is found in the same position in both castes. The glandular secretion passes through the membrane between the sting lancets. This exit is very narrow and indistinct, and is close to the setosa membrane, a hairy region of cuticle, which surrounds the entire sting bulb and acts as a platform for pheromone release (Lensky et al. 1995, Martin et al. 2005). Previously, it was called the basic or alkaline gland and was thought to be associated with the venom, as it is in ants (Martin et al. 2005). In solitary bees, which build underground nests, the Dufour's gland produces hydrophobic (water hating) substances used to line the nest and protect eggs against extreme fluctuations in humidity and against microorganisms (Abdalla et al. 2004). Some speculation still surrounds the precise role of the Dufour's gland in the honey bee.

There is great variability in the size and chemical composition of the Dufour's gland among the female castes and different aged honey bee workers. The gland of a three-day-old worker bee is tubular and markedly curved near its distal end and less so at the proximal end, unlike other species of bees (Ikenga and Chapman 1989). The Dufour's gland in queens is approximately 10 times greater in volume than a normal worker gland. The glands of queenless workers are slightly larger than those of queen-right workers, but these differences are not statistically different (Katzav-Gozansky et al. 2000). The queen's gland is hypertrophied (enlarged due to productivity) and contains up to 20 times more material than that of workers. Among the workers, the amount of secretion found in the glands of queenless egg-laying workers was at least four times higher than that of queen-right nurses or foragers (Katzav-Gozansky et al. 2002). Katzav-Gozansky et al. (2000) demonstrated that the Dufour's gland, both in workers and queens, is metabolically active throughout the individual's life.

Chemical analyses of the gland's secretion revealed that this gland exhibits caste-specific differences (Katzav-Gozansky et al. 1997b). In honey bees, the gland possesses only two classes of compounds, hydrocarbons and esters. The glandular secretions of workers are composed of a series of odd n-alkanes, and the secretions of queens are additionally fortified with wax-type esters. The main esters found in queen glandular secretion are: tetradecyl tetradecanoate, tetradecyl hexadecenoate, hexadecyl tetradecanoate, tetradecyl octadecenoate and hexadecyl hexadecenoate (Katzav-Gozansky et al. 2002). Queens and queenless egg-laying workers possess a bouquet of esters and hydrocarbons, whereas queen-right workers (nurses or foragers) and queenless foragers produce exclusively hydrocarbons (Katzav-Gozansky et al. 2000). While glands of egg-laying workers obtained under queenless conditions produced both hydrocarbons and esters, this was not true for queenless foragers. The reason for these differences between queenless workers is not known, but may be linked to either their age or task. It is possible that some physiological changes that occur in old foragers are irreversible, as was shown in hypopharyngeal glands (Huang and Robinson 1996).

"The Dufour's gland in queens is approximately 10 times greater in volume than a normal worker gland."

The gland is known to secrete but not produce hydrocarbons (Katzav-Gozansky et al. 1997a) which are used for waterproofing the cuticle and possibly involved in chemical communication (Abdalla and Cruz-Landim 2001). In both queen and worker glands, no in vitro incorporation of radioactivity into hydrocarbons was observed. This suggests that the copious amounts of hydrocarbons that are present in the gland result from sequestration rather than de novo (from the beginning) synthesis (Katzav-Gozansky et al. 2000). In addition to the hydrocarbons, the queen's gland secretes a series of esters (Katzav-Gozansky et al. 1997b, Martin et al. 2002) which function as part of the multi-sourced queen signal

"The gland is known to secrete but not produce hydrocarbons which are used for waterproofing the cuticle and are possibly involved in chemical communication."

(Katzav-Gozansky et al. 2003), while the workers' Dufour's glands secrete eicosenol (Martin et al. 2004) a low volatile alarm pheromone (Pickett et al. 1982). This may explain why workers are attracted by virgin queen Dufour's gland extracts and repelled by worker Dufour's gland extracts (Abdalla and Cruz-Landim 2001).

Both in vivo (within the organism) and in vitro (done in a cell free system) studies have demonstrated that ester biosynthesis in the Dufour's gland is not a caste-fixed phenomenon. Queenless workers that start to develop ovaries also biosynthesize the queen-type esters. Moreover, glands from queen-right nurse bees incubated in vitro also produce these esters, after a certain delay (Katzav-Gozansky et al. 1997b).

The queen's Dufour's gland secretion constitutes a component of the multi-sourced queen pheromone signal. It is attractive to workers, which form a retinue around the scented source in concentrations as low as 1/8 queen-equivalents. Bioassays reveal the ester fraction, not the hydrocarbons, to be the active constituents (Katzav-Gozansky et al. 2003). The function of the esters was corroborated by assays with the synthetic queen-esters mixture, which successfully mimicked the queen's secretion. When the queen's ester mixture was applied either on a glass slide or on another worker, a retinue formed around the "surrogate queen" (Katzav-Gozansky et al. 2001). As predicted from the queen-like secretion exhibited by egg-laying workers, their glandular secretion was also attractive to nestmates, however, to a lesser degree than that of the queen; while that of non-egg-laying workers was totally inactive (Katzav-Gozansky et al. 2003). The amount of secretion found in the glands of egg-laying workers is about 1/7-1/8 queen equivalents. Worker-attraction towards the glandular secretion of virgin queens was also demonstrated by Abdalla and Cruz-Landim (2001). Occasionally, under queenless conditions some workers attract a small but recognizable retinue, presumably by exuding some components of the queen pheromone. Such workers are designated as false queens (Crewe and Velthuis 1980). Since Dufour's esters seem to differ significantly between queen-right workers and egg-laying workers, Dufour's gland secretion may be involved in marking these workers as false queens.

Katzav-Gozansky et al. (2000) demonstrated that the synthesis of the gland's secretion is regulated. In the presence of a queen, ester production is inhibited. Once the queen is removed, the physiologically unconstrained gland starts to biosynthesize the queen-specific esters after a certain lag-time needed for the buildup of precursors and the enzymatic machinery Since there seems to be a link between ovarian development and the occurrence of the queen specific esters in the gland, it is possibly a marker of queen fecundity, a fundamental parameter affecting colony fitness.

Abdalla and Da Cruz-Landim (2001) completed a series of experiments to assess possible roles of the honey bee Dufour's gland secretion. Bioassays with extracts of queen and worker glands from two colonies were made under artificial conditions, in which nestmate and non-nestmate forager workers were tested. The results demonstrated that forager workers display behavioral responses when exposed to Dufour's gland extracts of nestmates, but remain indifferent when exposed to non-nestmate extracts. They were also able to demonstrate that forager workers are attracted by virgin queen gland extracts and repelled by forager worker extracts. These data demonstrate that the Dufour's gland secretion is colony- and caste- specific. The attractant remains in the nest. The repellent effect of forager worker extracts is interpreted as an alarm-like pheromone. The attractant effect of virgin queen extracts could be useful in the swarming process to attract scout bees to the eventual founder virgin queen or to attract old foragers to the virgin queen that remains in the nest.

Ratnieks (1993, 1995) suggested that Dufour's gland secretion serves as an egg-marking pheromone helping workers to discriminate between queen-laid and worker-laid eggs. Several features of Dufour's gland in honey bees support its possible function as the source of an egg-discriminating pheromone. This abdominal gland opens into the dorsal vaginal wall (Billen 1987) and its secretion may therefore be controllably applied onto the egg before deposition. Katzav-Gozansky et al. (2001) extensively evaluated the role of Dufour's gland secretion as a egg-discriminator pheromone and was able to refute this hypothesis. Workers honey bees were exposed to two combs simultaneously, one containing queen- or worker-laid eggs and the second containing treated or untreated worker-laid eggs. Treatments included extracts of Dufour's gland secretion as well as the synthetic esters that were identified in the secretion. Policing was clearly detected both in queenright and queenless colonies by the swift removal of worker but not of queen eggs. However, neither the glandular secretion nor its synthetic ester constituents were able to protect worker-born-eggs from policing. Treated worker eggs were removed significantly faster than queen eggs, and at the same rate as non-treated worker eggs. Chemical analyses of the queen abdominal tips revealed the presence of Dufour's esters, indicating that the glandular secretion oozes out and spreads over the cuticle around the genital chamber However, contamination while ovipositing may also explain the minute amounts of these esters that were detected on the egg surface. BC

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RESEARCH REVIEWED

The Latest In Honey Bee Research

Steve Sheppard

". . . we rely increasingly on the key pollination service provided by bees."

In this column, I typically discuss one or two scientific papers involving honey bees. However, this month I would like to cover a Special Issue of 13 research papers dedicated to the topic "Bee Conservation" (Paxton et al., 2009). The Editors solicited manuscripts from an international group of bee researchers and then assembled the work into a single volume. Collectively the Issue covered challenges facing the conservation and preservation of honey bees and other bees on a worldwide basis. While, by necessity, I can not provide in depth coverage to specific findings for each paper, I think a general description of the papers and their major conclusions will prove enlightening for beekeepers interested to know more about the "big picture"

The first paper describes a number of "pollinator initiatives" that have been undertaken at national, regional and global levels. These initiatives were developed by groups of individuals concerned with maintaining pollinator diversity around the world. In the case of the International Pollinator Initiative, a "plan of action" was developed with the intention to monitor pollinator populations and causes for decline, to improve taxonomic knowledge of pollinator species, to evaluate the economic value of pollination and increase the "conservation restoration and sustainable use of pollinator diversity in agriculture "

The second paper describes the role of "conservation ecology" in maintaining a stable population of honey bees and diverse communities. The authors discuss the possible roles of habitat fragmentation, habitat loss, nesting resources, land use, floral resources, predators, parasites, pathogens (yes, including CCD) and even global warming on bee conservation efforts. One conclusion: a combination of protected areas and "bee-friendly" habitats within agriculture will "become increasingly important for bee conservation."

The third paper covers the topic of bee genetics and its relationship to conservation and the documentation of pollinator declines. The author describes the importance of genetic techniques in resolving taxonomic questions, estimating the actual "effective population size" of bees and quantifying the decline of populations. The author notes that new genetic techniques now make it possible to use 100 year old pinned bees from museum collections (of bumblebees for example) to examine genetic changes through time.

A fourth paper specifically describes the biodiversity and conservation of European honey bees. In discussing threats to the various honey bee subspecies from this region, introgression or hybridization was considered a big problem and the authors referred to the many conservation areas or genetic reserves that have been or are now being set up to preserve specific subspecies in various European countries. These include efforts to restrict the widespread introduction of "superior" subspecies into habitats with established local populations ("superior" here being used sarcastically). Additional threats were seen to come from habitat losses, pathogens and parasites and pesticides.

The fifth paper asked the question, "Is there a need for conservation of honey bees in Africa?" The authors first describe how the situation appears to be much better at present for most African honey bee subspecies (resistant to mites, no widespread CCD, etc.). However they contend that there is an argument to be made for "preventative conservation measures" and give examples such as the need to reduce deforestation and to implement trapping regimes at ports of entry to capture potential invasive species.

Moving eastward, the sixth paper describes the conservation of Asian honey bees. As an important center of diversity for the genus *Apis*, the authors noted that nine honey bee species are native to East Asia. One of the most important pressures on these native honey bee species, aside from continuing deforestation, includes ever-increasing human access to forests and the vulnerability of some bee populations to honey hunting. The authors recommend that studies to determine sustainable rates of honey hunting should be a high priority

The seventh paper describes a bee survey for a region that includes much of Europe and Africa north of the Sahara desert. The results of the survey show that species diversity varies widely across the region and some specific case histories are described that show bee declines. One value of consistent and coordinated survey efforts across numerous countries is that insight into possible causes or trends in bee populations may emerge from careful study of the geographic distribution of various species.

The eighth paper considered the "diversity threats and conservation of native bees in the Neotropics." The authors point out that the New World Tropics contain a highly diverse bee fauna of 5000 recognized species.

However, like elsewhere, significant threats can be attributed to deforestation, the increasing cultivation of land for agriculture and the introduction of non-native bee species.

Paper number nine covered diversity and conservation concerns of honey bees in Australia. While land clearing and agriculture play a known role in reducing bee diversity, as do the introduction of non-native bees and plants, one of the big concerns of the authors was the limited availability of taxonomic knowledge about much the endemic bee biodiversity of this region.

In the 10th paper the authors addressed the issue of conservation of bees in Africa and Madagascar, concentrating on non-honey bee species. The authors pointed out that the incredible diversity of bee species in some parts of Africa contrasts with a situation where our scientific understanding of their taxonomy lags far behind. In consideration of the issues of deforestation and other pressures on habitat fragmentations, they concluded that there was "an urgent need to identify areas with a high bee diversity and conservation strategies for these areas need to be specifically designed " The pace of development toward these solutions was seen as being "far too slow "

In paper number 11, the authors covered the topic of bumble bee conservation and vulnerability They cited evidence of bumble bee declines worldwide and discussed a host of threatening factors including pathogens, land and forage changes and global warming. The inadvertent introduction of non-native bumble bees to new areas via disposable pollination units used for greenhouse production was noted and the authors recommend "live bumblebees should not be moved across continents or oceans for commercial purposes."

The 12th paper reviewed the state of knowledge concerning the impacts of "invasive alien species" on bees. In this case, the authors were referring to introduced non-native bees and plants. While there were no hard and fast rules to predict the negative, neutral or positive effect of a specific introduction on a particular native species, the authors did point out some interesting historical facts related to human impacts on honey bee populations, through transfer of various honey bee subspecies into the ranges of others and the introductions of some bee species into parts of the world when they previously did not occur These include the replacement of the native German dark bee with Carniolan honey bees in Germany and the introduction of a European bumble bee species throughout parts of the middle east though inadvertent release during use as a glasshouse pollinator

In the final paper in the Special Issue, two of the editors provided a consideration of bee conservation from the "global" perspective. They considered the results of the previous 12 papers in the issue and produced a Table listing some of the main threats or factors that currently are or predicted to impact bees in relation to geography and taxonomy These main factors included habitat loss or alteration, invasive species, parasites and diseases, exploitation, extinction and global climate change. They go further to suggest possible actions that could be taken to help conservation efforts, while recognizing that some aspects of the problem, such as the increasing use of land for agricultural production, and global climate change have political implications far outside of the realm of beekeepers and bee scientists. BC

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Paxton, R.J., M.J.F Brown and T.E. Murray (eds.). 2009. *Special Issue on "Bee conservation."* Apidologie 40: 193-416.

HYGIENIC STOCK IN GOOD HANDS

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In a December 2008 *American Bee Journal* article we described the history of the MN Hygienic stock and our plan to return to our original goal of encouraging beekeepers and queen producers to select for the hygienic trait from among their own colonies and stocks of bees. The reasons for selecting bees for hygienic behavior are clear· hygienic colonies can defend themselves against American foulbrood, chalkbrood and *Varroa*. Here we show that three queen producers from Minnesota have successfully incorporated the hygienic trait into their operations. In fact, their naturally mated colonies are just as hygienic as the instrumentally inseminated breeder queens we had been providing them! This means that they can select and maintain the MN Hygienic stock on their own. We are extremely encouraged by the results of extensive testing we did on their colonies this past Summer (2009). In effect, we can certify the probability that their queens will produce hygienic colonies. We sincerely hope this article encourages all queen producers to select for hygienic behavior and creates an open discussion on the future of trait certification in the U.S.

The Beekeepers: Darrel Rufer, Mark Sundberg, and Jeff Hull

These three Minnesota based beekeepers have been raising queens from the University of Minnesota's Hygienic stock for over 10 years. They are all migratory beekeepers who move their colonies to the South every Winter to raise queens and make divides. They successfully incorporated the hygienic trait into their operations because, over time, they requeened all of their colonies with daughters of highly hygienic queens. The daughter queens produced drones that carried the hygienic trait. Now when their new hygienic queens go on mating flights the majority of drones they encounter come from other hygienic colonies. We ensured that the original hygienic stock they received from the University was genetically diverse, and by looking at the solid brood patterns of their colonies, we are confident that the colonies are not inbred.

June 2009, after they transported their colonies back to Minnesota, we tested approximately 100 colonies across three or four apiaries in each operation for hygienic behavior using the freeze-killed brood assay (see Box). The time it takes the bees in a colony to remove freeze-killed pupae is correlated with how long it takes them to detect and remove disease and mite-infested brood from the colony The faster a colony removes freeze-killed brood, the more resistant it is to American foulbrood, chalkbrood and *Varroa* mites. For more detailed information, including a printable poster with instructions, see the University of MN Bee Lab website at: **http://www.extension.umn.edu/honeybees/**

There are two ways to interpret the results of the hygienic test. The strict measure is to consider only the percentage of freeze-killed brood that is completely removed within 24 hours (**% removed**). Completely removed means there are no remains of the dead pupae in the cells after 24 hours. We use this strict test to choose breeder queens for the next generation of selection: only those colonies that completely removed ≥ 95% of the freeze-killed brood within 24 hours are chosen as breeders.

The liberal measure includes the pupae that are completely removed and those we call "partials" that are in the process of being uncapped and removed (**% removed + partials**). From our experience, the brood that is partially uncapped and/or partially removed will be completely removed by 48 hours, so the liberal measure gives an approximation of how clean the test will be by the next day We use the results of this liberal test to characterize the level of hygienic behavior in a population of colonies.

Comparisons

The results of the liberal hygienic tests of the three MN beekeepers are shown in Table 1 For comparison, we show results from hygienic tests on colonies at the University of MN. The University colonies contained queens from the MN Hygienic stock that were reared and instrumentally inseminated at the University in the Summer, and were wintered either in MN or in southeast TX. We show the tests for 171 inseminated queens from 2004 through 2008 that survived a Winter

To show the progress that has been made over the years, we also compared the tests of the MN beekeepers' colonies and the University of MN breeder colonies with those from a published study we ran 10 years ago, in 1999 (Spivak and Reuter, 2001). In that study, we compared colonies containing hygienic queens from the 4th generation of the breeding program that were naturally mated with unselected drones, to colonies with unselected queens mated to unselected drones (Table 1).

We show the average level of hygienic behavior for each group of colonies, using the results of the 24 hour liberal test. We also show the percentage of colonies that scored ≥ 95% for the liberal test. Finally, for the strict test, we show the percentage of colonies that could be selected as breeders for the next generation (i.e. those colonies that completely removed ≥ 95% of the freeze-killed brood within 24 hours).

Hygienic Test How-To

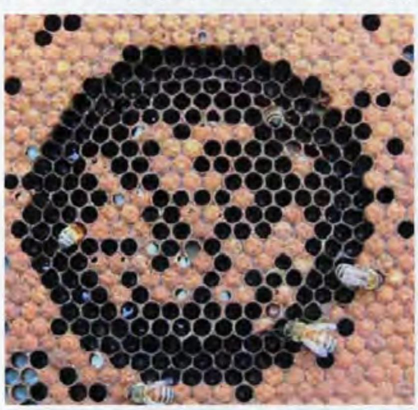
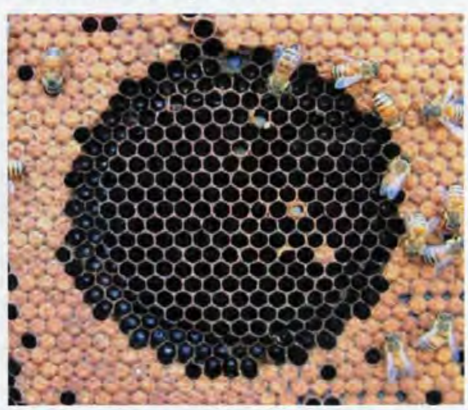
Step 1. Open the desired colony and select a frame with sealed brood. Check a few cells for the age of the pupae. You want to freeze pupae that are midway through development: make sure you can see the eyes of the pupae; they can be white, pink or purple.

Step 2. With a twisting motion, press a 3" diameter tube into a patch of sealed brood down to the midrib of the comb. For the tube, we use PVC pipe with a groove cut using a 90° V-shaped metal router – see left picture below Count and record the number of cells not sealed by wax. There are, on average, 160 cells encompassed by the tube. Subtracting the number of unsealed cells from 160 gives the number of sealed cells.


Step 3. Fill a 10 oz Styrofoam coffee cup with liquid nitrogen. To create a seal, pour approximately ¼" into the tube, wait until it bubbles off, then pour in the rest. Let the nitrogen evaporate and allow the comb to thaw until you can gently remove the tube without damaging the cells.

Step 4. Mark the frame so it is easy to identify (we use a colored tack to mark the frame and the side of the frame the test is on) and return the frame to the colony

Step 5. In 24 hours retrieve the frame. Count and record the number of cells still completely capped and the number of cells the bees have begun to work on (referred to as partials), which range from cells starting to be uncapped to pupae chewed almost to the bottom of the cell. Below shows a test from a non-hygienic colony (left) with many capped cells and partials, and a hygienic colony (right) with just one capped cell and three partials.

To calculate the % removed and the % partials and removed use the following formulas:

%removed = <u>160 # unsealed cells at the start - # cells sealed at 24 hrs</u>
160 - # unsealed cells at the start

%removed = <u>160 # unsealed cells at the start- # cells sealed at 24 hrs - #partials at 24 hrs</u>
+partials 160 - # unsealed cells at the start

Table 1. Results of Hygienic Behavior tests among three groups of colonies: 1) colonies with instrumentally inseminated breeder queens from the MN Hygienic breeding program (tested over a five year period), 2) colonies with naturally mated queens produced by three MN beekeepers, 3) colonies from a study (Spivak and Reuter, 2001) in which 4th generation hygienic queens were naturally mated with unselected drones, and colonies with unselected queens mated with unselected drones.

Liberal test results are shown as the average level of hygienic behavior for the groups of colonies, with different letters indicating a significant difference, and the percent of colonies that scored ≥ 95%. Strict test results show the percent of colonies that completely removed ≥ 95% of the freeze-killed brood within 24 hours, and that could therefore be selected as breeder colonies for the next generation.

		Liberal Test		Strict Test
Colony Source	**Colonies tested**	**Average ± s.d. score % removed+ partials**	**% colonies scoring ≥95% removed+ partials**	**% colonies scoring ≥95% completely removed**
1. MN Hygienic Breeders, University MN (2004-2008)	171	96% ± 8% a	75%	36%
2. MN Beekeeper 1 (2009)	118	96% ± 6% a	79%	29%
MN Beekeeper 2 (2009)	123	92% ± 11% a	63%	24%
MN Beekeeper 3 (2009)	87	92% ± 12% a	62%	24%
3. Hygienic Q + unselected drones (1999)	61	82% ± 18% b	38%	2%
Unselected Q + unselected drones (1999)	47	75% ± 19% c	13%	0%

Take Home Messages

1) The results of the tests using the liberal measure of hygienic behavior from colonies owned by the three MN beekeepers are similar to the results of the breeder queens in the MN Hygienic stock (refer to Table 1). If you purchase a queen from one of these beekeepers, there is 62%-79% chance that the queen will produce a hygienic colony (e.g., it will score ≥95% removed+ partials in 24 hours). This is a very high probability!

2) The strict measure is used to choose breeder queens for the next generation. The MN beekeepers had 24 29% of the tested colonies that could be used as breeders. Considering that each of these beekeepers had over 2,000 total colonies, they have many potential colonies to choose from as breeders! Also, these hygienic colonies are producing drones that carry the trait, ensuring that queens in the next generations mate with these males and carry on the trait.

3) The colonies with hygienic queens mated with unselected drones from the 1999 study were considerably less hygienic than the MN breeder colonies and the colonies owned by the MN beekeepers, by both strict and liberal measures of hygienic behavior This shows that for colonies to be hygienic, the drones in the area where the queens mate should be from hygienic colonies as much as possible. Many hygienic queens sold in the U.S. currently fall in this category: they are mated with unselected drones and on average, are not highly hygienic.

On the other hand, the colonies with hygienic queens mated with unselected drones from the 1999 study were notably more hygienic than the unselected queens mated with unselected drones. This shows that simply using hygienic queens helps! Hygienic queens produce hygienic drones for future matings!

Trait Certification?

By testing a number of colonies, we can certify the level of hygienic behavior in the stocks owned by the three MN beekeepers. Beekeepers can purchase a queen from these beekeepers knowing the probability that the queen's colony will be hygienic, which illustrates how certification of selected stocks or traits of bees might be carried throughout the US. We think beekeepers should be willing to pay a higher price for certified stock. The possibilities for the future are rich and varied. For example, once we have good field assays, we could certify other traits that help bees resist *Varroa* such as grooming. We plan to continue helping the MN beekeepers with stock selection to maintain the quality of their hygienic stock and to ensure they maintain sufficient genetic diversity within their operations.

As shown here, beekeepers can successfully incorporate the hygienic trait into their stock. Here beekeepers purchased instrumentally inseminated queens from the University of MN. It is important to note, however, that all stocks of bees carry the hygienic trait, and the use of inseminated queens as breeders is not necessary. We encourage all beekeepers to select their stocks of bees for hygienic behavior We strongly emphasize the need for genetically diverse stocks of bees in the U.S., and discourage the use of one or two stocks of bees, which could narrow our gene pool and lead to monocultures of bees. Choose your own colonies with desirable traits, such as high honey production, gentleness, good wintering ability and queen longevity. Perform the hygienic test on those colonies, and breed from the highest scoring ones. Requeen with the daughters and repeat each year with new breeder queens. It may take four to six years to saturate your area with hygienic drones, but you will see notable results! If you want to eliminate chalkbrood and AFB in your colonies, and reduce your *Varroa* mite loads, start your selection program for hygienic behavior today! BC

MN Beekeepers

All have limited availability of queens. They do not sell packages!!

Darrel Rufer only orders for 50+ queens: 612.325.1203

Mark Sundberg, large and small orders: 218.721.5942,mdsund2000@yahoo.com

Jeff Hull, very limited availability, 218.205.6426

Aknowledgements

We thank the MN Honey Producers Association for their generous and long-lasting financial and moral support of the MN Hygienic breeding program. A special thanks to Bill, Wendy, Katie and Ross Klett for raising queens in TX and feeding us excellent dinners.

Action On The CAP Grant

Ke th Delaplane

We all believe that Nosema, viruses, mites, nutrition, pesticides, and migratory stress can all combine in synergistic ways to kill bees. But which factors are the most potent? the most causative? the most insidious? the most fundamental?

I was sharply reminded this past Summer of the plight of the modern beekeeper But to tell the story I must go back two years to the winter of 2007 when I came to realize that my personal apiary, a monument to 30+ years of accumulated equipment, trial and error, bee lines of every genetic description, spectacular honey crops and equally spectacular failures, moderate profits and occasional losses, the topic of books and TV shows, the artifact of a boyhood hobby that opened doors to science, learning, a life career, and the world stage of apiculture – had reached a disgraceful state of neglect. It had become the victim of my dwindling time and energy Having a full-time job in honey bee research and education my weekdays were never far from the sights, sounds, and smells of beekeeping, and our 200-hive university apiary gave me plenty of opportunity to work in the bees. All this meant that I was getting my bee fix, and when the weekends arrived and I surveyed my personal hives, it was always easy to put off until next weekend the things that ought to have been done now And by the Winter of 2007 that policy had borne its fruit. My apiary was a shabby collection of dead-outs, sprinkled here and there with a colony that was valiantly hanging on in the midst of the carnage of those calling it quits. It was embarrassing.

Seized with a fit of resolve and new ambition, I purchased cases of new woodenware – 24 hives' worth – and spent the Winter of 2007 working in my shop and making Big Plans. By Spring those boxes were filled with bees and new queens, and by that Summer my apiary had roared back and I was selling nucs to meet an insatiable demand for bees among the swelling ranks of hobby beekeepers in north Georgia.

But the rot set back in. Life doesn't stop coming at you, and the bees in the backyard, never clamoring for attention, were easy to ignore. The dead-outs increased, the wax moths proliferated, and bee traffic at the entrances subsided. This past Summer I didn't have enough bees to bother selling nucs, and today that brief empire of 24 hives has dwindled to one lonely survivor Multiply that kind of colony attrition across the country and you get an idea of what the modern beekeeper is up against.

I take the time to tell this story because those of us who measure our beekeeping experience in decades will remember a time when such things didn't happen. Bees, to paraphrase a saying usually attached to Mac computers, "just lived." But now the default setting is different. Bee colonies, absent heroic inputs by the beekeeper – feeding, medicating, endlessly replacing queens – are just as likely to fizzle and die. Exceptions abound all over the place, and I'm overstating things to make a point. But there can be no denying that the fundamental sustainability of honey bee populations has plummeted in recent years.

In historic terms, bee die-offs are episodic and nothing new. But I think it's arguable that the North American declines of recent years are systemic and qualitatively different from earlier records. We should not be surprised at this, owing to the fact our world – a world of synthetic pesticides, unprecedented intensity of agriculture, and global admixing of organisms – is qualitatively different from the world of, say, the Isle of Wight epidemic in Britain in the early1900s. Another thing that's different is the degree of public attention being levied at the plight of pollinators. Bee decline has become the stuff of headline news. More to the point, bee decline has become the stuff of priority for federal agencies that fund research. And this is indeed a silver lining in the clouds.

I am heavily involved in one example of this new level of federal funding – the Managed Pollinator Coordinated Agricultural Project (CAP). The CAP concept is an innovation of the Cooperative State Research, Education, and Extension Service (CSREES) – the branch of USDA responsible for competitive grants (not to be confused with the Agricultural Research Service that administers in-house federal labs). CSREES solicits and awards no more than one CAP project per year CAP projects are multi-state, multi-year, national in scope, and integrate research with information delivery The idea is to eliminate redundancy and create a seamless transition between new research and the public clients who can use it. Examples of other CAP projects include Avian Influenza, Porcine Reproductive and Respiratory Syndrome, and Johne's Disease in cattle. 2008 was the year for Managed Pollinators. I am privileged to head a successful proposal team of over 20 research and extension specialists representing 17 institutions who pooled our resources and ideas into a Coordinated plan to reverse honey bee decline.

Our approach has been to assume that bee decline is a product of numerous interacting factors, synthetic and organic. Late research seems to bear this out. Colonies expressing a set of symptoms sometimes called Colony Collapse Disorder (CCD) – rapid loss of adult bees and low ratios of adult bees to brood – have also shown comparatively high rates of mixed infections, including viruses and Nosema species[1] It has, in fact, proven difficult for our CAP team to isolate single infections of anything. Multiplicity rules. And no doubt, multiplicity complicates the research problem exponentially, but I am also concerned that multiplicity has engendered something close to complacency among beekeepers and researchers, the logic of which, stated or unstated, goes like this: There are so many interacting factors that we cannot understand the cause of bee decline so we are left with no practical recommendations except vague concepts like 'practice good management.' I, for one, am weary of these unproductive and thinly-veiled confessions of ignorance. It's not much different saying bee decline is caused by everything than to say bee decline is caused by nothing. Yes, we all believe that Nosema, viruses, mites, nutrition, pesticides, and migratory stress can all combine in synergistic ways to kill bees. But which factors are the most potent? the most causative? the most insidious? the most fundamental? – in other words, the most important to focus on? I may be naïve to think this, but I am hoping that our research programs, both inside and outside the CAP team, will eventually focus, prioritize, and shorten the list of candidate agents. Only then can we make practical advances on solutions. But as it stands, we are essentially in the same place medical science found itself in the days before Louis Pasteur pioneered germ theory Medical practitioners blundered around in the dark, seeing symptoms, cataloguing them, sometimes making logical associations between cause and effect, and even occasionally stumbling upon a cure. But once Pasteur stripped away the veil of ignorance surrounding microbes, medicine leaped forward like a horse out of the gate and the world has not been the same since.

Although we are not promising to release any horses, our CAP team is heavily invested in basic research on viruses, Nosema, pesticide toxicology, and comparative stress of migratory versus stationary management because we are guessing that these broad categories hit close to the mark in identifying the factors most contributive to bee decline. We are heavily invested in bee breeding and conserving genetic diversity because we think that when it comes to mites and pathogens, genetically resistant bees are going to be part of the answer We are mindful of the economic and practical roadblocks to bee breeding and are taking steps to address these with new initiatives in beekeeper training and education. We are mindful that honey bees are not the only show in town and have allocated roughly 7% of our budget to toxicology and pathology of non-*Apis* pollinators. We are aware of the high expectations attached to this CAP when it comes to knowledge delivery and are pleased to partner with the ARS bee labs in launching an extensive web-based Bee Health information clearinghouse at eXtension.org – viewable at **http://www.extension.org/bee%20health**. This site is well worth your time. In its mature state it's envisioned to become the most complete and authoritative compendium of literature on bee health management that science can offer

Now after one year of funding (see the August '09 issue for information on the first year) I would like to begin a series of articles to inform beekeepers of our activities and progress, where you will be hearing from team members responsible for different goals of the program. These goals are defined broadly as (1) Determine and mitigate causes of CCD, (2) Incorporate resistance traits and increase genetic diversity, (3) Improve conservation and management of non-*Apis* bees, and (4) Deliver research knowledge to client groups. You can read about these goals, our team members, management structure, and other relevant information at our dedicated website **http://www.beeccdcap.uga.edu/**

And lastly – a word about expectations. $4.1 million sounds like a lot of money, and it is. But $4.1 million divided among four years and 17 institutions translates to rather modest sums for each participant. We are not promising to solve bee decline and return beekeeping to the golden days before *Varroa*, but we do expect to narrow and focus the list of candidate factors, interpreting and delivering to beekeepers to the extent possible the practical applications of our work, operating without redundancy and with a high level of group coordination, input, critique, and readjustment. I'm responsible for balancing optimism with reality. While we celebrate this award as a positive expression of federal interest in the welfare of bees and beekeeping, we recognize that the problem is immense and the outcomes of our project not entirely predictable. A problem of this magnitude will demand sustained levels of research and education funding from private and public sources for years to come as well as a culture of cooperation, mutual goodwill, and openness to new ideas and expectations among bee scientists and beekeepers. I think we're up to the task.

Next installment – Reed Johnson at the University of Nebraska will talk about unexpected interactions of bee hive chemicals. BC

*Dr. Keith Delaplane is a Professor in Entomology, University of Georgia – **www.ent.uga.edu.***

Find all CAP Grant links at the Bee Culture.com links page.

[1]vanEngelsdorp et al. 2009. http://www.plosone.org/article/info:doi/10.1371/journal.pone.0006481

What Integrated Pest Management Means For Today's Beekeeper

M ke Hood

Today's beekeepers must be vigilant in their pest management plans to stay one step ahead of their pest problems.

Integrated Pest Management, or simply IPM for short, is a phrase that is familiar to many beekeepers today This concept of pest management seeks to control pests using a variety of strategies that are safe, effective and economical and will lead to a sustainable level of control. The concept and application of IPM should be covered in all beekeeping short courses that include pest management. My colleague and good friend Nicholas Calderone at Cornell University states this well when he said, "a discussion of IPM is important at anytime because it always represents the best long-term approach to the problem of pest management[2] "

According to a 2008 University of Massachusetts report[4], IPM "is a long-standing, science based, decision-making process that identifies and reduces risks from pests and pest-management-related strategies. It coordinates the use of pest biology environmental information and available technology to prevent unacceptable levels of pest damage by the most economical means, while posing the least possible risk to people, property, resources and the environment. IPM provides an effective strategy for managing pests in all arenas from developed agricultural, residential, and public areas to wild lands. IPM serves as an umbrella to provide an effective, all encompassing, low risk approach to protect resources and people from pests. (IPM Roadmap, USDA, 2004)."

HISTORY

For a little history of IPM, we need to go back to the period in time just after WWII when many synthetic insecticides were introduced in the United States[3] Growers welcomed the addition of these new pest control products which were very effective at dropping the pest density quickly to a manageable level. However entomologists soon noticed that these mostly calendar-based insecticide spray programs also killed off the natural predators of these pests which allowed a quick resurgence of the target-pest requiring additional applications. These repeated applications sometimes killed off many beneficial pollinators too, such as bumble bees and honey bees. In California and in some of the cotton-belt states such as Arkansas, entomologists soon began a new concept of pest management called "supervised

Mike Hood, right, is presented the EAS Roger Morse Award by EAS Chairman Jim Bobb at EAS 2009.

pest control" which sought to reduce the number of pesticide applications based upon a monitoring system that estimated the number of target insects in the field and the natural enemy populations[3]

By the 1950s, California entomologists coined the term "integrated control" which sought to identify the best mix of chemical and biological controls for many major pests[3] The goal of this new program was to use chemical insecticides in a manner which resulted in minimum effects on the biological control complex. By regular monitoring, the grower treated only when a population level reached the economic threshold to prevent the pest population from reaching the economic injury level, which is the point at which the economic losses of the crop would exceed the cost of the control. Treating only when the pest population reached an economic threshold, offered the grower other benefits such as reduced number of pesticide applications which saved money by reducing the cost of pesticides and reduced the number of trips through the field to apply the treatment. Longer periods between treatments also extended the useful life of a given pesticide or family of pesticides having the same mode of action by slowing the development of resistance in the pest population.

Later on, the phrase "integrated pest management" was introduced which expanded the concept of integrated control to include all classes of pests and to include other control measures in addition to chemical and biological controls[3] Genetic, cultural, mechanical, and physical tactics were added to the IPM arsenal. In 1972, President Richard Nixon directed federal agencies to promote the concept and application of IPM to all relevant sectors. This expanded approach to pest management included the cooperation of entomologists, nematologists, plant pathologists, and weed scientists[3] Much of the applied research that makes up the core of the IPM programs has been developed since the 1970s at land-grant colleges and universities in the U.S. and their counterparts from other parts of the world[5]

Although IPM's early focus was on agricultural field pest management, it now includes diseases, weeds, and other pests that infest homes, commercial buildings, landscapes, and animals. Schools, golf courses, dairies, and poultry operations are just a few examples of areas

"Integrated pest management" was introduced which expanded the concept of integrated control to include all classes of pests and to include other control measures in addition to chemical and biological controls.

which use IPM today.

The IPM concept used by many growers was certainly a step in the right direction for the beekeeping industry because it resulted in less use of pesticides in the field. However, even after this program was instituted, there were times when circumstances lead to massive areas being sprayed with pesticides such as the boll weevil eradication program that began in the Southern U.S. during the 1970s[1]. Some beekeeping operations were hammered by pesticides and beekeepers became reluctant to place their colonies near cotton. Another example of massive pesticide sprays occurred following hurricane "Hugo", a category five hurricane, which struck the eastern coast of North and South Carolina in September 1989. Aerial mosquito abatement programs were mobilized which required large areas to be sprayed even during daylight hours which had a detrimental affect on the feral as well as managed colonies of honey bees and other pollinators in the region.

Up until this time in history, IPM was a term foreign to most U.S. beekeepers. However, this changed during the 1980s and 1990s when the term IPM became a familiar topic listed on many beekeeping meeting programs. *Varroa* mite management issues became more complex when chemical control failure became widespread. Enter such terms to the modern beekeeping vocabulary as pest surveys, treatment thresholds, chemical rotation, ether roll, *Varroa* detector boards, and bottom board screens. Most beekeepers today practice varying levels of IPM in their beekeeping operations. For a full comprehensive understanding of IPM, let's take a serious look at some principles of modern day integrated pest management.

BEEKEEPING IPM PRINCIPLES

There are eight basic principles of a beekeeping IPM program:

1. Acceptable pest levels: The emphasis here is on pest *control* rather than on pest *eradication*, because complete elimination of a pest is sometimes impractical and often impossible. A pest eradication program is often too costly and environmentally prohibitive. However, a good example of an eradication program is the USDA Boll Weevil Eradication Program[1] mentioned above. This program has been ongoing since fall, 1978 and it continues to be a costly program. The program is based upon a clear understanding of the vulnerable biology of the weevil, the high-chance of success of the program, and support/cost-sharing of the program with cotton growers. As for the U.S. beekeeping industry, a recent pest to enter the U.S. is the small hive beetle which was first collected in South Carolina in 1996, but was not properly identified till July 1998 from beetle collections in Florida. Following this first identification, surveys were soon conducted in the Southeastern U.S. for small hive beetles and reports indicated that the pest was found to be wide spread in the coastal areas of four SE states. Not only was the pest found in managed colonies, but they were also found in feral colonies as well. Once a beekeeping pest is established in the wild, any efforts at eradication are a real challenge and very costly Apparently, eradication efforts for small hive beetles in the U.S. were not seriously considered. As with other beekeeping pests such as the tracheal and *Varroa* mites that have been discovered in the U.S. in the past 25 years, eradication efforts were not practical because of widespread occurrence of these pests and a biological control system was neither available nor practical. Therefore, the U.S. beekeeping industry has set out to establish "acceptable pest levels" using treatment thresholds or action thresholds. These are defined as the pest population level at which significant control is necessary to prevent the pest population from reaching the economic injury level. For the beekeeping industry, the economic injury level is the pest population level that colony collapse is expected, regardless of control efforts. These thresholds are pest, site, and time specific and must be re-developed or confirmed in regions outside the region for which they were developed. Using a research-based treatment threshold system will eliminate many unnecessary treatments, thus slowing down resistance of a pest to a specific plant-derived or synthetic chemical. If too high a percentage of the pest population is repeatedly eliminated by a chemical, the process will leave behind the resistant part of the population which will reproduce forming a resistant population[3] By not killing off all the susceptible individuals of a population by a chemical, there will be left behind un-resistant individuals that will dilute any resistant genes in a pest population.

2. Preventive cultural and regulatory practices. The national "Honey Bee Act" of 1922 was passed by Congress and signed into law by the President in 1922[9] The Act was mainly a result of an effort to protect our honey bees from the Isle of Wight disease that had occurred in other parts of the world. This legislation restricted the importation of live adult honey bees into the U.S. and has played a major role in reducing the chance of honey bee pests and diseases from entering the country The Honey Bee Act of 1922 has been amended three times since its passage, 1947, 1962, and 1976[9] Prior to passage of this federal legislation, unsuccessful attempts were made to import other honey bee species into the U.S., such as *Apis dorsata*, the giant honey bee. The American beekeeper Frank Benton attempted in 1881 to import colonies of the giant honey bee from Java, Ceylon, and Singapore[10] We now know that the giant honey bee was unsuitable for the U.S. and importation of this species may have brought along with it some unwanted diseases and pests. Some state bee laws have been passed that disallow the management of colonies contaminated with American foulbrood and burning is required. A cultural change has taken place in the Southeastern U.S. where small hive beetles are a problem. Most beginner level short courses in the past have taught beekeepers to place their colonies in apiary locations that receive morning sun and afternoon shade. However, beekeepers are now advised to locate their apiaries in full sun rather than shade to reduce small hive beetle reproduction.

Although IPM's early focus was on agricultural field pest management, it now includes diseases, weeds, and other pests that infest homes, commercial buildings, landscapes, and animals. Schools, golf courses, dairies, and poultry operations are just a few examples of areas which use IPM today.

3. Monitoring or scouting practices. A good understanding of the biology and behavior of a pest, along with early detection will normally offer the beekeeper time to use non-chemical options. Most pests have a seasonal life cycle which is predictable and therefore a monitoring program can be more focused at certain times of the year Since insects and mites are cold-blooded, their development is temperature-controlled and development cycles have been recorded based upon accumulated degree-days. In most cases concerning honey bees and their pests, they live in mostly a temperature-controlled environment, so development time is easier to predict. The one exception is wax moths that are a major problem in stored drawn comb which is normally stored away from the warm environment inside a beehive. The wax moth's life cycle slows drastically in the wintertime, so a degree day model is possible. *Varroa* mites are a good example of a honey bee pest which monitoring is essential for effective control, especially during some parts of the season. Reliable survey techniques that have been rigorously tested are always needed in an effective IPM program. *Varroa* mite detector boards, ether roll, and alcohol wash are tools used to monitor or survey for this pest. *Varroa* mite treatment thresholds have been developed in some regions of the US and regular estimation of the *Varroa* population to discover damaging pest levels is highly recommended.

4. Genetic control. Genetic practices include the release of sterile or incompatible individuals with the intention of flooding the population with inferior stock. The Screwworm Eradication Program beginning in the 1930s proved to be one of the "greatest success stories in the history of American Agriculture[7]." The screwworm was a major, widespread insect pest that fed on living tissues of warm-blooded domestic and wild animals in the U.S., Mexico, and most of Central America. USDA scientists developed a sterile male release strategy that provided screwworm eradication using little or no pesticides[7] In beekeeping, the development or selection of pest resistant stock is a good example of genetic control which is relative to beekeeping today. The Russian Honey Bee Breeding Program, lead by USDA/ARS bee scientist Thomas Rinderer, was begun in 1997 when queens were imported into the U.S. from Russia. Colonies headed up by Russian queens show resistance to *Varroa* mites as well as some tolerance to small hive beetles. *Varroa* sensitive hygienic (VSH) bees have been selected from present U.S. honey bee stocks and they also show a tolerance or resistance to *Varroa* mites. This program was initiated and maintained for several years by now retired USDA/ARS bee scientist John Harbo. Jeff Harris now heads up the VSH program at the USDA/ARS Honey Bee Genetics and Physiology Lab in Baton Rouge, LA. Queens from both programs are now available for purchase in the U.S.

5. Mechanical control. In the beekeeping industry, many mechanical control tools are used to maintain pest populations below a treatment threshold. More drastic measures, such as chemical control, are recommended when the pest population reaches the treatment threshold level. However, mechanical control is highly recommended for honey bee pests, such the small hive beetle. Hand smashing, vacuuming, and trapping are examples of recommended control measures for this pest. The use of screened bottom boards is recommended for *Varroa* mite control which allows the *Varroa* to fall to the ground and not recover Cutting or removal of drone brood from a colony is a form of mechanical control for *Varroa* mites because *Varroa* are naturally attracted to drone brood over worker brood.

6. Physical control. Physical practices include the use of heat, cold, light, humidity, carbon dioxide, light, ventilation or sound to control a pest. Most pests have physical limitations that affect their activities or survival. Freezing temperatures are an excellent way of killing or controlling wax moths and small hive beetles in stored drawn comb. Light and ventilation are also recommended for control of wax moths in stored drawn comb. Heat has been shown to affect *Varroa* survival and placement of colonies in sun may aid in control of this pest. Placement of colonies in sun will also create drier soil conditions which disrupt the lifecycle of small hive beetles.

7. Biological control. Natural biological processes or materials such as beneficial insects or various pathogens offer safe and sometimes economical methods of pest control. A *Bacillus thurengensis* (BT) product, Certan®, was once registered for wax moth control in stored comb but the registration of this product has been withdrawn and is no longer available in the U.S. Soil nematodes, *Heterorhabditis indica*, are currently marketed in the U.S. (Southeastern Insectaries, Inc., Perry, Georgia, ph. 1-877-967-6777) for small hive beetle control as a soil treatment to kill beetles when they enter the soil to pupate. The imported fire ant, *Solenopsis invicta*, an insect predator may also assist in controlling wax moths in stored comb and small hive beetles as they enter the soil. The braconid wasp, *Apanteles galleriae*, is a parasitoid of wax moth larvae in the Southern U.S., but low parasitism rates have been reported in natural infestations[8]

8. Chemical control. Synthetic pesticides played a major role in the management of honey bee pests like *Varroa* mites following their first discovery in the U.S. Most beekeepers quickly jumped on the pesticide treadmill beginning in the late 1980s and many simply wanted to know when to place the pesticides in the hive and when to remove them, a similar move (calendar based approach) adopted by the agricultural industry following WWII. Some beekeepers elected to illegally use products not labeled for beekeeping pests, such as *Varroa*. Within a few years of repeated use, some beekeepers began to report that products like Apistan® and Checkmite+® were no longer effective for *Varroa* mite control. If these products had been used by beekeepers in an IPM approach and only when necessary requiring longer periods of time between treatments, the useful life of these synthetic chemicals would likely have been prolonged. Other chemicals such as organic acids (formic acid) and plant derived chemicals or essential oils (thymol) are available to beekeepers in their pest management strategies today A similar fate has now developed in many states where American foulbrood is resistant to the antibiotic, Terramycin. Using a single antibiotic for several years likely played a major role in this problem, also. Pheromones, attractants, and repellants are other chemicals that play a role in beekeeping pest management. An old standby chemical Para dichlorobenzene (PDB) is a chemical that is used in stored comb to repel wax moths. Small hive beetles are known to be attracted to the honey bee alarm pheromone and a yeast- based material produced by beetle larvae. These newer type chemicals will likely play a major role in beekeeping pest management in the future.

8 IPM Principles

1. Acceptable Pest Levels
2. Preventive Cultural And Regulatory Practices
3. Monitoring Or Scouting Practices
4. Genetic Control
5. Mechanical Control
6. Physical Control
7. Biological Control
8. Chemical Control

IPM Economics.

The U.S. beekeeping industry must continue to promote and use the IPM concept to survive in these uncertain economic times. According to Jacob (2009), "the pervasive and rampant problems of acaricide resistant mites, Terramycin resistant foulbrood, and contaminated honey threaten modern apiculture's economic viability and clean wholesome image." IPM can help the beekeeper achieve pest management goals by minimizing the use of chemicals in the short run and extending the useful life of specific chemicals in the long run[2] Many IPM tools are inexpensive and used in combination with other strategies offer the beekeeping industry pest management solutions which are more sustainable. The IPM program practiced by commercial beekeepers will be different from the program used by the part-time beekeepers, so no set strategy will be used by the industry. Beekeepers will have to be on the lookout for new pest management options which reduce costs, help maintain acceptable pest levels, and ensure all hive products are safe for the consumer Under the IPM concept, the U.S. beekeeper will now have to be more patient than in the past and learn to be more content with allowing a pest to survive at low population levels.

Advantages and Disadvantages of Beekeeping IPM

Advantages:

- More sustainable
- Decreased use of chemicals in the hive
- Extends the useful life of chemicals

used by lengthening time between applications
More economical in long run
Less chance of hive product contamination
Less exposure by beekeeper to chemicals

Disadvantages:
Additional time and commitment required to implement
Often requires multiple strategies
Evaluation required

SUMMARY

Unsustainable honey bee colony losses in recent years have been extremely costly to the U.S. beekeeping industry. Beekeepers are now faced with many unforeseen challenges that have been identified or discovered as a result of a broad-based research net that has been cast to solve the much publicized colony collapse disorder (CCD). Regardless of the outcome of the CCD dilemma, the U.S. beekeeping industry must utilize an integrated pest management approach to survive. This means that beekeepers will no longer have the luxury of using a single pesticide or a single antibiotic to control their colony problem, as in the past. An arsenal of strategies is now available to maintain healthy colonies including genetic, biological, cultural, mechanical, physical, and chemical control. Beekeepers must be better informed than ever to select the best combination of IPM tools for their beekeeping operation. Beekeepers must be capable of evaluating and modifying their IPM strategies to survive and succeed in the future. Asking the right questions is important[3] Were my strategies successful this year? Was the pest or disease prevented or managed to my satisfaction? Did the pest population exceed the treatment threshold level? Were there any unintended side effects as a result of my actions? And lastly, what must I do in the future to improve my pest management plan? Today's beekeepers must be vigilant in their pest management plans to stay one step ahead of their pest problems.

(This is the first in a four part series on IPM for the modern beekeeper The next three articles will focus on IPM for three major beekeeping pests in the U.S.) BC

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Good Bees In Bad Places

There goes the neighborhood

James E Tew

Our bees are not always perfect. It's hard to admit.

I'm writing this article for a national bee magazine that serves the international honey bee industry I have personally kept bees and studied bees for more than three decades. As do you, I have a deep, abiding concern for the welfare of all bees and or our honey bee industry But sometimes our good bees are simply in the wrong place – or at least the wrong place by our human perspective. It's hard to admit.

Time and again, we've all been exposed to standard industry hyperbole: "Bees are angels of agriculture," ".. every third bite we take ..."or "modern agriculture could not survive ..." All of these points are true, but pollination and bee/plant interactions are stunningly complicated procedures. We must view, with caution, our inclination to lump all pollination issues into the bite-sized response, *"Without bees, we're dead."* Well maybe but maybe not. There are lots of crops; lots of situations; and many, many species of bees. There are annual weather variations and there are populations of crops pests that cause annual problems. There are commercial growers and then there're legions of backyard gardeners, each with pollination concerns. Though the pollination issue may not be as concise as we tend to make it, many types of plants do require insect pollination and bees are prominent pollinators. When all points are considered, consistently bees are considered to be good animals – or so it would seem. But there are times when our bees wander from the path of goodness. When our bees wander, what are our responsibilities as bee enthusiasts?

A good bee on an undesirable plant – spotted knapweed.

Steadily, bees are coming to town

Though not the only reason, a primary reason for my topic this month is that, in growing numbers, bees are increasingly being kept in urban settings. In Sunday Magazines, in the popular media and in City Council meetings, gardens (and bees) are popular topics. Here in Ohio, all the major cities – Cleveland, Columbus, and Cincinnati, have liberalized beekeeping ordinances. Additionally, native pollinators are being seen in a more positive light by many citizens. Well, that's a good thing – right? Yes, it is, but with caveats. You see, not all citizens are bee-loving individuals. Sometimes, they have justifiable causes.

Case history #1

Good morning, a bumble bee nest (the big fat ones) is in the mulch bed by my porch. I had to dig up the area to install a 4 x 4 post. I sprayed the nest with bee and wasp killer and thought that would be the end of it. If I go several days without working in the bed, they do not hang around. As soon as I dig in the area of the old nest, or otherwise disturb the dirt or mulch, soon I have bees hovering around, landing and walking around the area. What is attracting them back and what can I do to repel them or keep them from coming back when I work in the area. I am assuming they are smelling the old nest, the queen or something. Thank you.

An email question from my web page.

I always feel like a traitor to bees and beekeeping when I provide information to individuals who are planning to eliminate bees – of any species. But the fact is that sometimes, good bees are in bad places. I expect some of you will write to admonish me for not telling the writers of such requests of all the wrongs they are doing by killing such beneficial pollinators. As best I can, I do. I hint. I suggest. I imply But I must always remember that the constituent contacted me for information and not a lecture. Until bee pollinators are designated as protected species, I am hamstrung. And then there are beekeepers – and bees in town. There should be no problems. Our bees pollinate; ergo, we will be loved. Not always.

A good bee having a bad day.

Case History #2

I know nothing about bees. A year ago a beekeeper moved across the street and we have had various bee incidents since the bees arrived. All of the problems have centered around him not providing water or letting his water source run dry. He was recently gone and the water trays (inadequate and pitiful) dried up while he was absent. Every day I have had more and more bees at my fountain in my garden. Today they swarmed my house – primarily in the front around the fountain. I am talking thousands but not in a thick cloud like when the queen moves. He filled up his water sources after I called him. According to your article on the subject, they probably won't go back to his water, but stick with my steady resource. Should I unplug and drain the fountain if I ever want to sit on my porch again?

An email question from my web page.

There can be no doubt. As bees move to town, there will be incidents where non-beekeepers feel put-upon for having to co-exist with our insect charges. No doubt, to such neighbors, our bees seem to be thousands of tiny leashless dogs marauding the neighborhood. I challenge you; indeed, I challenge me, to offer such a testy individual a lecture on the goodness of pollination. I mean these same people want landfills and sewage treatment plants but they don't want these facilities right up under them. Additionally, they want pollination, but they don't particularly want bees. Where is the middle ground? Is there middle ground?

What can we do – if anything?

Please know that it is not my intent to whip us and our bees, but there are some issues here that our industry needs to address. I have frequently referred to an incident that occurred about 25 years ago.

An old white-haired beekeeping guru of Wooster, Ohio, (now deceased) was rudely told to move a beeyard he had had for many years that was neighboring a newly installed car dealership. Apparently, there was bee poop on millions of dollars worth of new cars. Yes, the old man was grandfathered in. No, he was not in violation of any city regulations. But yes, he would be tied up in court for years to come or he could move the yard. He moved the yard. He's gone. The bees are gone. The yard is gone. The dealership is still there.

In a second more recent incident, an EAS Master Beekeeper was required to move a long-time established yard due to neighboring complaints about bee poop rain on their cars. The neighbor was able to get the situation designated as a "health" issue so without a city ordinance restricting beekeeping, the Health Department forced the beekeeper to move his colonies. Here's the rub – there is not a lot beekeepers can do to address such issues. Yep, we can keep fewer colonies, but that just makes the problem somewhat smaller, but it does not eliminate the problem.

Good bees in bad places – the walls of houses

If you keep productive bees long enough, you will – sooner or later – lose a swarm. Some swarms you can prevent, some you can hive, but occasionally one gets away Locating a suitable nest cavity in a house is a common event. Also common is for the home owner to really be upset at having the bee interlopers take up there. Time and time again, every year, from my lab we must tell people that the honey bees in their home walls must be removed by a professional and that it will not be cheap. We're all beekeepers here, but just for a minute, try to be a homeowner who does not particularly hate bees but one who didn't mean to live with them either If ever good bees were in a bad place, this is it. Frequently, the homeowner feels guilty about killing beneficial insects, but the risk of honey leaking through the walls into the house, someone being stung or maybe house painters refusing to work around flying bees puts this hypothetical individual in a difficult and expensive spot.

Good bees in bad places – pollinating noxious weeds

Bees at bird watering stations; bees collecting water from feedlot run-off; bees defecating on neighboring cars; bees at the swimming pool; bee swarms moving off your property; and bees nesting in house walls are common neighbor complaints for which we have few recommendations.

But it's not always neighbors. If ever we had a situation of good bees in bad places, it is when our bee pollinators successfully pollinate noxious, invasive plants. We even make a surplus honey crop from these plants sometimes. ***Speaking only for the honey bee program at The Ohio State University, I am emphatically not encouraging the cultivation of any noxious plants for nectar or pollen sources for our bees.*** But the fact is that if these plants are available, both honey bees and native bees will readily forage on many of them. Now there's a conundrum – beleaguered bee species that are struggling to find proper food sources, all too often finds something productive only to have it deemed "noxious." We need the bees, but we don't want these invasive plants usurping our native vegetation. Where is the middle ground?

I recently began to get communications from Invasive Weed Groups. I have posted nectar and pollen sources for honey bees on my web page and hard copies have been in circulation for many years. The callers felt that by listing these sources on university fact sheets, I was implicitly recommending their cultivation as food sources for bees.

There are three plant species that the callers felt should be pulled from the list and no mention made of them. In the defense of beekeepers, I suggested that simply ignoring the existence of the plants in question would not stop bees from foraging on some of these plants and that beekeepers would continue to ask questions about suitable plants for use by their bees. I suggested that I develop a list of nectar/pollen producing plants that exhibited invasive characteristics. Even as I suggested this, I was apprehensive. What makes a plant species very bad or just plain bad? Some invasive plants such as Purple Loosestrife *(Lythrum salicaria)* are easy calls to make. While this is a good plant for bumble bees, honey bee and butterflies, it definitely is not a good plant for our wetland environments. ***Do not plant or propagate Purple Loosestrife.*** But what about plants like Vitex species – or Viper's Bugloss (*Echium* sp.) a relative of Purple Loosestrife? In some states, species of these plants are considered noxious plants while in other states, they are just exotics. In Ohio, even yellow and white sweet clover (*Melilotus alba* Medik. and *M. officinalis(L.))* are listed as invasive weeds. In Australia, Salvation Jane *(Echium plantagineum)* is an excellent honey plant; however, the plant is called Patterson's Curse by some landowners who must try to control the plant overrunning their farmland. Millions of Australian dollars are spent each year eradicating this plant.

At this time, there is essentially nothing beekeepers can do to prevent their bees from visiting undesirable plants. So, there it is. The insects we nurture and research – the insects that we depend on for the pollination for our diverse food supply – the insect that pollinates flowers that enhance the quality and experiences of our lives – these same beloved insects are readily pollinating undesirable invasive plants. You know how we always say how much fruit and vegetable set is increased by providing bee pollinators? Well, that is the same effect these bees have on some of these invasive plants. Good bees in bad places and we can't do anything about it.

Good bees exhibiting bad judgment

We see bees in our hives and we see busy bees on flowers. Normally, all seems right with the world. That idyllic world can, at times, be very hard on our bees. Spiders, skunks and birds love bees. Every day bees are eaten alive by other animals.

All the pollination benefits that we know of don't make much difference when someone has your bees in their birdbath.

Oddly, there seems to be no biological love lost between two neighboring hives. For coveted food supplies, bees will readily rob and kill each other Occasionally, bees build combs in the open. Not a bad scheme in the tropics, but very bad judgment in temperate climates and in Winter months. Some bees will strangely fly out on bright, snow-covered days and die in great numbers. I don't know what's up with that behavior Pesticide-treated areas and night security lights – two more places for good bees to have bad luck. It's a hard world out there for bees.

As with our children

As with our children, family and friends, we care deeply about our bees. We do all we can to help make them productive and healthy Bees are fundamental to our human society It is hard to conceive that such beneficial insects so often end up doing the wrong thing in the wrong place. We must always remind ourselves that the pollination good they do far outweighs the occasional bad they may do. Thank goodness for that. Otherwise, beekeepers find themselves responsible for pulling up a lot of obnoxious weeds. BC

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WINDING DOWN AT THE WHITE HOUSE

K m Flottum

White House Beekeeper Charlie Brandts and the White House bees are about done for the season. It's been an interesting year for the pair the First Bees and the First Beekeeper in this best of all apiary location.

The bees did fairly well this season, all things considered...media attention that any movie star would relish, prop wash from Marine One, school kids by the score and other visitors galore, Easter Egg Hunts, an Organic Garden right next door but still, they managed to do Charlie and the White House proud.

Early on they took off and Charlie was able to make his first harvest in June. Shortly after however, the queen slowed down...almost stopped laying in fact, but the bees kept collecting nectar But because she slowed the population began to dwindle and curing that second batch of honey took longer than Charlie thought it would.

The colony eventually requeened itself. .a practice Charlie strongly supports...and the pace picked up again. He was able to harvest three more times later in the Summer and into the Fall. When we last talked he still had a super to extract but his total then was 119 pounds, and he figures he'll end up with about 135 pounds or so. That's about four times the average of others in his area this year

He's done a couple of mite drop tests to get a handle on the mite population, just to see what his bees are up against, and there's a healthy population of mites living at The White House, too. Average daily drop ranges from 116 to 139, but the bees still seem to be thriving. The no-chemical approach Charlie believes in can be a harsh mistress, but the survivors always seem to do better, he feels. Bart Smith, a researcher and retired Bee Inspector, now at the USDA Beltsville Bee Lab took a look in early October to size them up and see how they're doing. Bart's assessment was pretty positive, and he didn't see obvious signs of *Varroa*, deformed wing virus, or other *Varroa*-induced problems in spite of the counts. So far they're holding up just fine, he said.

Charlie will let them go into winter .and the winters there are colder and longer than I first suspected. with between 60 and 80 pounds of honey stored in two deeps, a pretty typical wintering arrangement. They'll get busy again in late February or early March when the first pollen sources show up, and from there on it's get ready for season two.

Some of the honey already harvested has been used for very special occasions, and in very elaborate settings. The G20 meeting in Pittsburg

From left to right – Bill Yosses, the White House Executive Pastry Chef, Susie Morrison, Assistant Executive Pastry Chef and Charlie Brandt, the White House Beekeeper.

in September was an opportunity for the First Family to provide gifts for the spouses of the members. The First Lady gave a China set embellished with symbolic flowers and a specially designed hand blown glass honey jar and dipper, made of non-leaded glass in the studio of Caleb Siemon and Carmon Salazar from California. White House honey, of course, went with the jars. Each unique jar was engraved with White House Honey 2009.

Much of the honey will be used for baking and cooking later this year but as of yet most of it is still in the pails it was collected in from the extractor Raw, as Charlie describes it, because it is unheated and only coarsely strained.

"All this has kind of taken on a life of its own", Charlie said in October, referring to the attention these bees have drawn.

"I knew it would take some time but sometimes it takes more than any of us first thought. But it's been good so far, and we've been able to reach a lot of people with good information about bees and beekeeping. .especially the kids", he said.

"And isn't that what we're supposed to be doing here?" he said.

If fact, that's what we're all supposed to be doing. BC

What's So Bad About *Apis Cerana?*

Doug Somerville

This bee could be just as bad as any of the mites, or even worse.

References to Asian honey bees usually refer to *Apis cerana*. Asian bees in the genus *Apis* actually include quite a few identifiable species.

Giant honey bees include a number of species although the principle one is *Apis dorsata*. This bee is 'big,' I mean big. It is approximately 25mm long (an inch in the old language). Besides its size the other dominant characteristic is the large single comb it builds which can measure a meter and half long, and a meter deep. The bees cluster over this comb which is often quite visible under a cave overhang, under the branch of a very large tree or even under the eave of a multi-story building.

Another bee is often referred to as the 'dwarf' honey bee of which *Apis florea* is the principle species. The bee, as its name suggests, is small and forms fist sized colonies in amongst bushes and shrubs.

The Asian bee, namely *Apis cerana*, has a number of subspecies much the same as the European honey bee, *Apis mellifera*. This bee is about two-thirds the size of European honey bees.

So why is this information of interest, or of what use is it to Australian beekeepers?

Two factors are important, one includes the 'known' mites that some of these bees carry and the other is the direct competition and threat these bees pose on our managed bees.

Varroa mites need no introduction, they have evolved with *Apis cerana* for many hundreds of years. They usually reproduce on the Asian honey bee drones and don't bother the worker brood. Generally speaking, *Varroa* and

Apis dorsata

Apis cerana Asian honey bee

Apis mellifera European honey bee

Photo taken by Paul Zborowski
www.close-up-photolibrary.com

Asian bees have found a balance. Denis Anderson's work in CSIRO discovered that not all *Varroa* are the same. In fact some strains of *Varroa* are lethal to our honey bees, *Apis mellifera* where as other strains don't seem to be able to reproduce on *Apis mellifera*.

Denis named the most destructive of these mites *Varroa destructor* Not all of the different types of these mites are that harmful to our honey bee, it's the 'Korean' haplotype which is the big, big baddie.

This mite is now responsible for millions and millions of dollars worth of damage to the world honey bee industry Up until recently it was believed that the *Varroa* mites on the Asian bees in Indonesia and Papua New Guinea (just off the northern tip of Australia) (PNG) were not a problem to our honey bees as they were the harmless *Varroa jacobsoni* mite.

Very recently, last year in fact, Denis Anderson found *Varroa* reproducing on European honey bees in the PNG highlands. His initial reaction was that these must be *Varroa destructor* Further investigation actually demonstrated that the mites were in fact *Varroa jacobsoni*, which would appear to have now adapted to live on our honey bees. We now have two mites that pose a major threat to Australian honey bees.

Back to the other bees, the giant honey bee is the natural host of *Tropilaelaps clareae*. This mite is four times more lethal than *Varroa* mites on our bees. The other problem with this mite is that there is very little published on the management of honey bees hosting this mite.

So what's the probability of any of these mites arriving in Australia?

Well, the good news first, tropilaelaps mites are spe-

"Asian bees have a worse temper, swarm more, make far less honey, out compete European bees for forage, and rob like mad. They are not manageable, and they are not economic."

cific to giant honey bees, when they transfer onto honey bees they die out when no brood is present. There is also a low likelihood of giant honey bees entering Australia (not impossible), thus this pest mite presents a reduced risk when compared to *Varroa* mites.

Now for the bad news. For years Australian bee scientists and those who are responsible for monitoring biosecurity risks have expected an incursion of *Varroa* mites. Up until 2000 New Zealand did not have mites. But after being found on the North Island they spread to the South Island in 2006. The *Varroa* species in PNG is now reproducing on *Apis mellifera*. Thus wherever you look we are now literally surrounded by 'bad' mites.

In the past an Asian bee incursion of which we have had two, one in Darwin successfully eliminated and the other current incursion in Cairns, was not considered a problem in relation to carrying nasty mites as the bees where hosts of *Varroa jacobsoni*. Now the game is different. Any bee incursion from just about any Apis species into Australia now poses a massive risk of also bringing into Australia a mite that will have a massive impact on our beekeeping industry and also on our plant industries due to the major disruption to pollination services.

Back to the title of this article Asian Honey Bees, which most often refers to *Apis cerana*. Yes, they are currently in Cairns (the northern tip of Australia) and the Queensland Government is in the process of attempting to eradicate them. This current lot of bees have been tested for mites and they have been found to be free of any mites.

The question has been asked, so why worry about this new introduced bee? The short answer is this bee could be just as bad for the Australian beekeeping industry as any of the mites, *or even worse*.

Asian honey bees are very stripy and are about two-thirds the size of our honey bees. Many of their behaviors are very similar to our honey bees. They sting, they swarm etc.

An Australian funded project in the Solomon Islands has tracked the devastation of the Asian bee on honey bees. It is not native to these islands and neither is the honey bee. Honey bees are an established industry in the Solomons. Since the invasion of Asian bees, many hundreds of honey bee colonies have been wiped out. The authorities put this not down to mites, but to competition for nectar and pollen plus the Asian bee robbing stores from honey bee colonies.

Honey bee colonies may swarm once a year whereas Asian bees many swarm five or six times through the year Thus they have the capacity to build into large numbers of colonies. The sheer number of Asian bee competitors are out competing the honey bee. The Asian bee numbers have got to a point where they can be readily observed entering honey bee colonies and stealing the food stores in managed hives. Honey bees have just not been able to cope and have been disappearing in large numbers.

So why not keep Asian bees instead? The productivity from honey bees (European) is 10 times greater than Asian bees. A yield of 100kg/hive (220 lbs.) is a reasonable annual yield from commercial honey bees in Australia, whereas a yield of five to 10kg/hive (22 lbs.) from Asian bees is considered an average. Their prolific tendency to swarm makes them very difficult to manage. Asian bees are not an economic proposition.

Apparently Asian bees can be found throughout the PNG highlands. The temperatures in some areas drops to as low as 4°C(40°F). Thus, given the PNG experience, we could expect Asian bees to inhabit most areas of Australia, (and much of the southern U.S.).

If mites enter Australia, they will become a pest of our managed honey bees and a major competitor with native animals for nectar and pollen. Fortunately there is a volume of information available on how to kill the mites and manage a sustainable commercial beekeeping operation. The scary thing is if Asian bees establish in Australia and spread across the country I think given the Solomon Island experience they could be a major nightmare for the Australian beekeeping industry, possibly more so than the mites they carry and also become a major environmental pest. BC

Reprinted from Australia's Honeybee News July/August 2009

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Going To California

Kitty Kiefer


Wes Card
Glenn Card

Getting Ready, Getting There and Getting Back

Merrimack Valley Apiaries first went to California from South Carolina in 1989. One trailer load, or about 500 colonies, went. Fire ants were not yet an issue – the agricultural inspections at the borders of California were still interested in the medfly and at that time there were probably half as many acres as there are now in almonds. This was before CCD and Merrimack Valley Apiaries had about four thousand colonies.

Commercial pollination is hard on the bees. And as mono-culture expands and becomes pervasive as an agricultural practice in the big states, it gets harder and harder on the bees. The pesticide, herbicide and insecticide usage always impacts the bees, and mono-culture saturates the land with acres and acres of the same chemicals, year after year All the land. There are no hedge rows, grazing areas or fallow land. Some growers spray off the label and under less than perfect conditions. Growers must sometimes spray out of sync, so chemicals drift. As we all know, bees need water and often the water in the irrigation ditches is not potable even for mammal consumption. Mono-culture also is laid out very efficiently, often by lasers. The rows are perfectly straight and square. The land in California's Central Valley is perfectly flat and the pallets of bees are usually perfectly aligned with rows and roads. The pallets are all the same height, all banded six (or four) to a pallet. And if you regularly paint your equipment, and it all looks perfectly one color – how can a bee ever find her way home? The bloom of almonds lasts maybe five weeks, but because of the need to get all the bees in for the bloom, bees often wait in holding yards in the midst of a complete dearth of bloom. So the bottom line is that commercial pollination is stressful for the bees.


The inhive feeder, with ladders installed to reduce bee drowning.

This all begs the question of how stressful it is for the beekeeper? Merrimack Valley Apiaries is based in Massachusetts and New York State, with a southern division in Louisiana. Occasionally some bees are sent to California from the Northeast, but not every year Bees from Massachusetts and New York, though strong, are more likely to be broodless at the time of shipping. When you "do" commercial pollination, you are paid on the strength of your bees. Bees from the southern part of the U.S. support limited brood production in January each year The beekeeper contracts with the grower or broker for higher populations and population is measured by frame counts – six frame, eight frame, 10 frame or even 12 frame averages. This is the number of frames of bees, not frames of brood. Eight frame is the norm with the growers and bonuses are paid for extra frames (and there are reductions for fewer frames). The growers inspect. It's

Loads are watered down before leaving Louisiana to help keep them cool.

The grafting building.

nice for the beekeeper to be present when they inspect. When bees travel to a pollination gig, between two and five percent go queenless on every trip.

It is a year round preparation schedule. Almonds bloom in February, so preparation begins in July Timing populations to the different blooms for pollination is critical. Weather is critical for planning work schedules, trucks and breeding queens. Location of colonies so that they build up and maintain strength is key – moisture, temperature and sunlight not to mention plants for forage. Merrimack Valley is a family business; Crystal and Andy Card and their sons, Wesley and Glenn, are the principals. When they plan for almonds, they begin their splits in the Summer with the bees in Louisiana.

I'm putting this down during the first week of September Currently Merrimack Valley Apiaries has about 22,000 colonies on the ground and flying. Starting in July, they made up splits of two sorts. Three thousand new hives were created, as well as about 4,000 re-makes. The Louisiana farm used about 10,000 queen cells for these Summer splits and re-makes. The increases were finished by Labor Day These colonies are in their locations, strengthening. They are being fed a sucrose blend and pollen supplement. Around November, they may get another pollen supplement, and perhaps an additional blend of sucrose as well. Because Louisiana has fire ants, these colonies are placed on a plastic shield during the time of increase to keep ants out of the colonies. California does have a few resident fire ants, but they want no more and beekeepers from areas of resident ants have to keep ants out of their equipment. Every border crossing into CA has agricultural inspections for, among other things, fire ants. So plan on abating ants.

I'm writing this article as though 10,000 colonies are going to CA for 2010. Last season in 2009, a little over 8,000 or 18 tractor trailer loads went. So these numbers are based around anticipating 10,000 going. Merrimack needs between 18 to 20,000 colonies by the end of the Summer to send 10,000 colonies with an eight to 10 frame average. If the goal was a six to eight frame average, then they could probably get 12,000 colonies for almonds out of their increases. They always aim high – commit to quality Their reputation is their biggest asset.

So, starting November first, and ending by January 15th those colonies that were made up by Labor Day have been gone through, sorted, have had internal feeders of the cap and ladder sort installed, been given two pounds of pollen supplement and fumagillin, been placed on newly washed pallets with new bottom boards and kept on plastic to keep the ants out. The sorting occurs in the beeyards, and fly back can be an issue, so the possibility of loosing a frame of bees is to be planned for Louisiana has an inspection requirement for bees leaving the state, so the timing of that inspection is critical as well. This sort must be done by Jan 15th as then the bees begin to leave from holding yards that are tractor trailer accessible.

To plan effectively for sending 10K to California, the bees need to be ready to climb on the trucks by January 20th, with a lunch packed. By this I mean on the day before the truck is loaded, the bees receive a pound of pollen supplement and a gallon of syrup. The bees must all be there by February 10th. Merrimack's pollination colonies are six-way pallets and either double deeps or one deep and one 6 5/8 – the double deeps can go 432 to a load (Merrimack prefers step decks) and the shorter colonies can have 528 per load. The colonies can be heavy There are scales on Merrimack's Louisiana farm, so every load is weighed *before* the truck heads out, saving time and overweight fines. Time is of the essence at this point; keep the bees moving. Loading one or two loads a night is normal, until they've all gone. Andy watches the weather all the time – rain makes the work very messy and slick and SLOWS it down. He focuses his eye on the end date of February 10th

The bees arrive in California in a dearth. There will probably be Thule fog in the Valley – it may be clear but probably there will be a week or more of cold and dense fog. The geared up, healthy colonies may be confined or without forage for up to three weeks. Merrimack does their own distribution or spread out, and has two or three men that stay in California while the bees are there. Last year all 18 of our loads went through ant inspection with no hang ups. Being careful made the trip to California better and easier for the bees – their three to four day trip was not stretched to five or even six days of stress, with unloading, washing pallets and maybe being parked in the sun.

While the bees are in California, brood production and food consumption increase, so coming back they are 10-15% lighter than when they left. They get released from their contracts between the 5th and 15th of March. They are all back in Louisiana by April 1 Meanwhile, Merrimack

New splits get fed, and set askew so bees and queens can find their way home.

Installing queen cells.

is getting ready for the next two big pushes – for Eastern pollination contracts – starting with blueberries in New Jersey and honey production in Louisiana, which begins in the middle of April. All through March, there will be a thousand queens a day being produced in Louisiana, and as the bees come off the trucks they will be sorted and split again, immediately.

Timing, numbers and location are everything in this style of beekeeping. The year is broken into twelve months, and each month has jobs that are performed every year at the same time. When Merrimack first went to California in 1989 they had around 4,000 colonies. Now they have around 22,000. Probably the best advice I can glean for the smaller beekeeper is to follow the percentages and timing of Merrimack. At a maximum, they will send half of their population to California for almonds. So, if a small beekeeper has 120 hives to go any where for pollination, perhaps s/he should consider making a cooperative with other beekeepers of the same size and in the same location. Be conservative, plan on an eight to 10 frame average or better But, if a trip to California is not in your immediate future, there are lots of smaller and more local pollination jobs like apples, blueberries, raspberries, squashes, pumpkins, melons and cucumbers. Check with your local Agricultural Extension Agent for contact information. BC

Kitty Kiefer works with Merrimack Valley Apiaries moving bees and selling honey.

Small Cell Foundation And Varroa Mites

In three independent experimental replicates, we compared biometrics of *Varroa* mite and honey bee populations in bee colonies housed on one of two brood cell types small-cell or conventional-cell.

Jennifer **Berry**

I can't imagine being a beekeeper when *Varroa* mites first landed on our shores and began their destructive march across the U.S. What a feeling of hopelessness it must have been knowing there was little to nothing you could do to protect your colonies from the onslaught that was about to occur Aware of reports that mites were just a state or county away and within days or weeks your healthy colonies were about to encounter a pest they would have no defense against would have been maddening. These blood sucking ecto-parasites rampaged colonies from sea to shinning sea and by 1991, Kentucky, the last state thought to detect their presence, finally surrendered.

Within a year of *Varroa's* arrival, Apistan®, a fluvalinate based product, was quick to emerge as the cure-all against mites. In 1993 Miticur®, an amitraz formulation became available on the market. However, shortly following its introduction came a lawsuit charging the product damaged numerous colonies in central Florida. Therefore, it was pulled from shelves disappearing almost as quickly as it appeared. This left only one registered chemical available to beekeepers. Hence, it was only a matter of time before the effectiveness of this chemical began to diminish. As reports of mite resistance became increasingly numerous, a coumaphos based chemical treatment arrived on the scene in the late 90s. At the time chemicals may have been necessary but we all knew this was not the long-term solution.

Since their arrival beekeepers have been experimenting with a variety of non-chemical or "soft" methods for ridding colonies of mites and their destructive behavior Garlic powder and tea tree oil, camphor and wintergreen tinctures, foggers and smokers stuffed with sumac, grapefruit leaves, mineral oil and tobacco were some of the ideas tested. Researchers across the country were also diligently exploring alternatives to chemicals using Integrated Pest Management strategies – resistant stock, drone trapping, powder sugar and bottom screens.

Several years ago a good friend, Bill Owens, and I were talking about never again dumping chemicals into our colonies. He informed me about something he had been reading on the internet, small cell foundation. He was so influenced by the success stories being told he started to regress his colonies down to the smaller 4.9 cell size. Providing nothing other than small cell combs, it became his only method for *Varroa* control. Over time as he watched his colonies thrive without chemical intervention he was convinced, small cell was the answer So we decided to test this assumption here at the UGA bee lab. Over a three-year period we compared small cell to conventional cell comb to see if it impeded *Varroa* mite population growth in honey bee colonies. The following is a condensed version of our paper which has been submitted for publication in *Apidologie*.

Mite reproduction is limited to the brood cells of its host bee, and it is clear in free-choice studies that *Varroa* preferentially enter comparatively larger brood cells. When Message and Gonçalves 1995) compared brood reared in small worker cells produced by Africanized bees with brood reared in large cells produced by European bees, they found a two-fold increase in mite infestation rates in the larger cells. When Piccirillo and De Jong (2003) compared *Varroa* infestation rates in three types of brood comb with different cell sizes (inner width), 4.84 mm, 5.16 mm, or 5.27 mm, they found that the percentage of cells infested was significantly higher in the largest cells compared to the other two groups.

These kinds of observations have led to an interest among beekeepers in downsizing comb foundations as a cultural control against *Varroa*. In North America, the resulting "small-cell" foundation measures 4.9 mm (Dadant & Sons, Hamilton, IL, USA) compared to that of conventional foundation measuring between 5.2 mm and 5.4 mm. These numbers are derived by measuring the width of 10 cells in a straight line, inclusive of wall widths. In this study we challenged a null hypothesis of no difference in *Varroa* and bee population metrics between bee colonies housed on combs of small-cell or conventional-cell foundation.

In three independent experimental replicates, we compared biometrics of *Varroa* mite and honey bee populations in bee colonies housed on one of two brood cell types: small-cell or conventional-cell. Small-cell foundation was drawn out by colonies containing honey bees which had themselves been reared in small-cell combs. Conventional foundation was similarly drawn out by colonies whose bees were derived from conventional combs. Once combs were drawn we determined realized cell width (walls inclusive) by counting the number of cells in 10 cm linear (n=60 samples each cell type). Cell width from small-cell combs was 4.9 ± 0.08 mm and from conventional- 5.3 ± 0.04 mm. Ten of the hives each contained 10 frames of drawn small-cell comb, and the other 10 contained drawn conventional-cell comb.

Bees were collected from a variety of existing colonies (irrespective of rearing history) and combined in large cages to achieve a homogeneous mixture of bees and *Varroa* mites. Twenty screened packages were made up then transported to a test apiary in Oconee County, Georgia where each was used to stock one of 20 single-story deep Langstroth hives. One alcohol sample of *ca* 300 bees was collected from each package to derive starting mite:adult bee ratios and, by extrapolation, beginning mite populations (colonies were broodless so all mites were phoretic on adults). Queens from a single commercial source were introduced into colonies. All colonies received sugar syrup and pollen patties. Colonies were removed from the experiment if they died or their queens failed.

We collected the following ending parameters: daily mite counts on bottom board sticky sheets (72-h exposure), average mites per adult bee recovered from alcohol samples (*ca.* 100-300 bees), mites per 100 cells of capped brood, and brood area (cm^2). A measure of ending bee population was made by summing the proportions of whole deep frames covered by bees (after Skinner *et al.*, 2001) then converting frames of adult bees to bee populations with the regression model of Burgett and Burikam (1985). Brood area (cm^2) was converted to cells of brood after determining average cell density as 3.93 per cm^2 for conventional-cells and 4.63 for small-cell. From cells of brood we calculated the number of cells sealed by applying the multiplier of 0.53 derived by Delaplane (1999). From mites on adult bees and mites in brood we could derive ending mite populations and percentage of mite population in brood – a positive indicator of the fecundity of a mite population (Harbo and Harris, 1999). Finally, for the Aug 2006 colonies we sampled adult bees in Oct 2006 for average body weight

Although a significant and favorable trend for small-cell colonies was indicated for ending bee populations the chief interest in small-cell technology resides in its potential as a non-chemical limiter of *Varroa* population growth. By this criterion, the present results are not encouraging. The ending number of mites in brood, percentage of mite population in brood, and mites per 100 adult bees were significantly higher in small-cell colonies (Table 1). Moreover, with all remaining ending *Varroa* population metrics, mean trends were unfavorable for small cell as well (Table 1). We conclude that small-cell comb technology does not impede *Varroa* population growth. This null conclusion is reinforced by the facts that: (1) the experiment was replicated independently three times with start dates varying between spring and fall and test periods ranging from 12-40 weeks, (2) there were no interactions between start date and treatment for ending *Varroa* metrics, showing that responses were consistent across experiments, (3) the question of *Varroa* population growth was examined holistically with six dependent variables, and finally (4) the bar for performance should be high before a candidate technology is recommended for field use. It is worth noting that *Varroa* densities in this study (3.3 – 5.1 mites per 100 bees, Table 1) were not within the action threshold of *ca.* 13 mites per 100 bees shown for the region by Delaplane and Hood (1999).

Interest in small-cell foundation has been fueled in part by observations of Martin and Kryger (2002) that conditions which constrict the space between the host pupa and male protonymph mite promote male mite mortality However, as these authors point out, "reducing cell sizes as a mite control method will probably fail to be effective since the bees are likely to respond by rearing correspondingly smaller bees." Our study supports this deduction directly, and its premise indirectly: average bee live weight in October was numerically smaller in small-cell colonies than conventional (Table 1).

Ours is not the only lab to examine small cell foundation as an IPM tool for managing *Varroa* mites. This year the Florida Department of Agriculture and Consumer services published their small cell study in *Experimental and Applied Acarology* (2009) 47:311-316.

Other than a few differences in the methods and materials each study was fairly similar First they had a one-year trial with 30 experimental colonies (15 small cell- 15 conventional cell). Second, all colonies were located in the same area however to discourage horizontal transmission of mites between groups, small cell and conventional cell colonies were in separate apiaries.

Table I. Mean values (± se) for bee and *Varroa* population metrics in bee colonies housed on conventional- sized brood cells or small cells. Colonies of both cell types were set up in August 2006 (15966 bees), March 2007 (11612 bees), or April 2008 (10886 bees). Ending data were collected in June 2007 (August 2006 and March 2007 colonies) and August 2008 (April 2008 colonies). A one-time measure of adult bee live weight was made October 2006 for August 2006 colonies. The occurrence of significant treatment effects (á ≤ 0.05) is indicated by *

Variable	Conventional-cell	Small-cell
Beginning Colony mite population	303.1 ± 61.4	308.6 ± 54.1
Adult bee weight (mg) Oct 2006	141.3 ± 6.7	129.3 ± 5.7
Ending cm^2 brood	6320 ± 681	5627 ± 490
Ending cells of brood	24838 ± 2675	26053 ± 2271
Ending mites per 24 hr sticky sheet	17.4 ± 5.0	28.3 ± 6.0
Ending mites per 100 brood cells	0.9 ± 0.2	2.8 ± 0.6
Ending colony mite pop.	409.7 ± 93.4	670.5 ± 112.5
Ending mites in brood	134.5 ± 38.7	359.7 ± 87.4*
Ending % mite pop. in brood	26.8 ± 6.7	49.4 ± 7 1*
Ending mites per 100 adult bees	3.3 ± 0.5	5.1 ± 0.9*

The trouble with experiments is that they have a knack for demolishing good ideas. Aristotle was full of good ideas. In fact, his ideas about the natural world were so reasonable that they held unquestioned authority for over a millenium until the so-called enlightenment of the seventeenth and eighteenth centuries engendered investigative methods that mitigate against bias and presupposition. From this point on, arm-chair science was doomed, and many a brilliant idea has since been ship-wrecked by the unforgiving objectivity of the scientific method.

Variables measured were also the same with results again being very similar To summarize their findings; cm^2 total of brood, total mites per colony, mites per brood cell and mites per adult bee had statistically similar averaged values with some of those values being identical in both of the treatment groups (small and conventional cell). Also, by the end of the study mite levels in both treatments had surpassed the economic threshold. Hence, they concluded that no evidence was found to support anecdotal claims that small cell foundation will reduce *Varroa* mites and without further data cannot recommend it as a method for controlling *Varroa* mites.

Last year researchers at the Ruakura Research Centre in Hamilton, New Zealand also examined the effects of worker brood cell size on *Varroa* mite infestation and reproduction levels. The original research article has been published in the *Journal of Apicultural Research* and *Bee World* 47(4): 239-242 (2008). Their methods and materials were much different than the two studies previously mentioned.

Five different foundations with widths of 4.7, 4.8, 5.0, 5.1, and 5.4 mm were used. Six sheets of each foundation type were drawn out in honey supers I'm assuming to avoid brood being reared in the comb. Then 50 x 80 mm rectangular sections were cut out from each foundation type and randomly inserted into the center of newly drawn deep frames that measured 5.4 mm. The sections were held together in the deep frames with melted wax.

A total of ten nucleus colonies each were set up with two of the above mosaic frames, a frame of worker brood infested with Varroa, a frame of honey, adult bees infested with Varroa and a mated sister queen. Colonies were monitored to insure queens were laying well in each of the foundation sections.

For each of the foundation types between 234 and 440 evenly drawn cells were uncapped and the internal width of each cell measured for a grand total of 1636. Number of adult female *Varroa* mites and female *Varroa* deutonymphs were recorded along with the age of the pupae (determined by eye color).

Mite infestation ranged from 28% to 47%. The 4.8mm foundation size had a significantly higher infestation (46.6%) of mites than the others with the 5.4mm coming in with the lowest infestation of 27 7%. In this particular mite choice study the mites preferred the smaller cells than the larger ones. They too concluded that small cell does not reduce infestation by *Varroa* and therefore offers no solution to the mite issues in New Zealand.

The trouble with experiments is that they have a knack for demolishing good ideas. Aristotle was full of good ideas. In fact, his ideas about the natural world were so reasonable that they held unquestioned authority for over a millenium until the so-called enlightenment of the 17th and 18th centuries engendered investigative methods that mitigate against bias and presupposition. From this point on, arm-chair science was doomed, and many a brilliant idea has since been ship-wrecked by the unforgiving objectivity of the scientific method.

See Ya! BC

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Larry Connor

Changing The Way We Train New Beekeepers

A look at bee biology and how it affects colony management

Worms in the bee box

It was in the early 1970s and I was a shiny new Ph.D working my first job at The Ohio State University, and assisting the Ohio State Beekeepers Association with their annual Summer meeting. The banquet was about to start when a local TV crew appeared seeking an interview. After a few minutes of rapid discussion, it was determined that one of the senior members of the association, and a beekeeper local to the area, would be ideal to speak to the reporter and to show off the insides of a hive while the banquet started. I think that decision was made because the beekeeper enjoyed talking about bees much more than sitting at a stuffy banquet.

Later that evening on the TV screen appeared the beekeeper holding a frame of brood in his hands, talking about all 'them worms' at the bottom of the cells. And that 'them worms' would be fed by the nurses and would grow up and fill the bee box. This made an impression on me. Certainly I know that any publicity about bees and beekeeping is probably a good thing, and it is fitting to put an established pillar of the Ohio beekeeping community in front of the camera for the local news. (When given the choice I would rather have a local talk to the reporter and film crew rather than doing it myself, since I am from out of town and nobody really cares about an egghead Ph.D.)

But worms? Didn't this guy understand that they are not worms, but larvae? 'Relax, I said to myself, not many people really care what they are called. Worms refer to creeping invertebrate animals with long, slender soft bodies and no limbs: specifically, segmented worms, roundworms and flatworms. The immature bees (and they are already bees, but not yet adults), at the bottom of the cells are called larvae, the stage of immature insects between egg and pupa.

The education gap

The amount of education a person does or does not possess is no excuse for incorrect terminology And while this gentleman was doing his best (and enjoying every moment in the spotlight), he could have been prepared with some training somewhere along his beekeeping experience.

This still happens. Traveling from state to state and visiting with many different beekeepers I have learned that there is a tendency for the oldtime beekeepers to train the new crop that comes along every year Some of these trainers are excellent, and I give them all high marks for the volunteer work they perform. But just this Summer I heard an older beekeepers talk about grafting worms during a queen-rearing course. 'Earthworms don't turn into queen bees, I said loud enough for them to hear As a writer and a public speaker I labor over the selection of the proper word to use in my work, and nowadays I work hard to remain politically correct, minority sensitive and culturally aware.

Teaching teachers and mentors

Using terms like *worms in the bee box* reflect a time and place in our culture, and every country has locals with colorful but inaccurate speech. That leads to the first part of this article, coming to grips with our need for correct facts and terminology so we will have well educated beekeepers regardless of their level of their formal education. To accomplish this we need to teach the teachers, mentors, advisors and the helpers of new beekeepers so they receive the best possible education and learning experience. Right now we have a huge number of new people starting with bees, so it is important that we teach them correctly

All colonies are on several cycles. The food cycle, the abundance of pollen and nectar, are key biological events that determine the beekeeper's management plan. Here returning pollen foragers group at the entrance of a hive. The pollen is from goldenrod.

What do we teach?

A long-term, hands-on, colony-based education is the best way I know to teach a new person beekeeping, especially if the teacher is a skilled beekeeper with balanced education in apiculture, the science of beekeeping. There are not too many shiny new Ph.D.s in apiculture floating around right now, but we need to recruit them to teach the teachers, assisted by the retired entomology professionals who have a great deal to share about their knowledge of bee biology and beekeeping.

What needs to be taught are those subjects where bee biology and bee management intersect, bump heads or cause problems. My students are happy to get a calendar of management – what month to do certain management chores. And to some extent beekeeping by the calendar is an effective way to teaching basics. Unfortunately, it misses the one big theme essential to all beekeeper training: it fails to teach the student beekeeper to 'think like a bee' We need to produce a class of new beekeepers who are able to view bee activities and anticipate the needs of the colony In my mind, that is the essence of training beekeepers – getting them to anticipate and respond to the bee colony behavior and biology they observe – and then knowing how to provide the colony what it needs before the moment of opportunity has slipped past.

Learning to think like a bee is the challenge all beekeepers face, even if they have been keeping bees for decades, and have old dusty degrees from big universities. The bees are our ultimate teachers, and we must listen closely and watch carefully to determine what they are doing and what they may need next. And if we open a hive, pull out a frame of brood and ask the bees to 'show me your worms,' they will react a lot better than I did years ago. They just don't listen to what we say!

Here begins Bee & Beekeeper, a study of the biology and behavior of the honey bee, and how a beekeeper might best respond to what the bees are doing. There is so much to learn.

Natural Cycles

Day length

Humans divide the calendar into four seasons, and we mark the two Solstices and two Equinoxes with celebrations and even religious events. Bees have their own way to mark the calendar because they are amazingly sensitive to changes in day length. Most beekeepers are aware that colonies detect the increase in day length after the Winter Solstice, so that one colony might start rearing brood on January 4th, while another one January 8th, but they all respond to the lengthening day when the actual minutes of increase in day length is very small.

Worms? No, larvae (singular larva). These larvae are at the bottom of the frame where we expect to find them. There are also some eggs if you look closely.

At the Spring Equinox bees are rapidly building their colonies, but the equal day length of that moment seems to trigger stronger growth. And the Fall Equinox does the reverse, it marks the strong slow down of brood rearing, even in areas where food is abundant. Simple behaviors typical of the Spring, such as aggressive drone production, becomes increasingly more difficult once Fall has arrived. Drones are produced, but only under optimal food conditions.

Very few beekeepers have tried to manipulate the length of the bee's day because it is so difficult, with one big exception. Beekeepers in Canada and other northern locations have developed methods of wintering colonies in chambers where the temperature is regulated by heaters and air conditioners, and the carbon dioxide level is kept low with air baffles to bring in fresh air This is different from the 'cellaring' common to beekeepers 100-150 years ago, when bees were brought into the cellar of a house and kept there, doors opened on warm Winter days and closed on cold nights so the bees could be kept calm and consume a minimum of food reserves. Now, in the potato regions in the West, old potato storage facilities are being used to Winter bees. In fact, some beekeepers put the bees into storage at the start of Winter only to move the bees out and into California for almond pollination, and then return the colonies to the storage facilities for the rest of the Winter, removing them a second time in April.

When there is no daylight in a wintering facility the bees do not start rearing brood. If they do not rear brood they are not consuming as much honey or generating as much heat, carbon dioxide or water vapor When removed from the storage in April, the bees and queen respond to the rapidly increasing day length and prepare a large brood nest. The challenge here is with the age of the worker bees that are doing the brood rearing. They must be healthy 'fat bees' with good food reserves in their bodies. They must be from colonies that are either resistant to *Varroa* mites or have had mite treatment that does not shorten the length of these bees lives. If the bees that are kept in confinement are old or damaged they will not make the distance, the time from the last natural food of the Fall to the first food of the Spring. The must be free of *Nosema*.

The natural food cycle

Nature provides bee colonies with food early in the Spring. We will discuss early pollen and nectar sources some other time, but on a warm Winter day it is not uncommon to find bees at the bird feeder, or at the sawdust pile, searching from something sweet and nutritious. The bees are at the end of their long Winter's rest, and are eager to start the food gathering cycle as the weather and the flowers provide.

It is hard to separate weather from food sources, since the weather – more specifically the accumulation of heat units – is responsible for the growth of early Spring plants and the nectar and or pollen they supply to the bees. Some farm magazines and gardening websites track these stats for different areas of a state, so you can see where the plants are developing. In a state like Michigan, where Lake Effect rains and snows begin with the first cool weather of the Fall, there is a buffering temperature effect from the amount and late timing of the snowy weather At the edge of the Lake, for just a few miles inland, the area is never quite as cold as it gets in the center of the state, and many plants will survive along the lake that would be Winter killed inland. The State's major fruit and vegetable industry relies on this thermal effect. For the bee colonies in these areas, their development is also slowed, and ironically, the bees needed for pollination may need to be wintered inland where they will benefit from earlier forage than if left along the perimeter of the western shore.

There are two more common effects from geography Of course, the further North you are located, the later you expect plants to grow and produce food for bees. But there is also a mountain effect, most often demonstrated in places like North Carolina, where there are three regions, coastal, piedmont and mountains. Some beekeepers will move their bees so they can collect nectar or pollinate the same plant species by moving the bees up the mountain as the season progresses. Even in areas where you don't think of being terribly mountainous, there can be a week of difference due to elevation.

What needs to be taught are those subjects where bee biology and bee management intersect, bump heads, or cause problems.

The queen cycle

Every bee colony has another cycle that the beekeeper must keep in mind, one that is not calendar dependant – that is the queen's cycle, which may determine the swarming pattern for a colony Queens come in different ages, first date of egg production, and, more importantly, different life expectancies. They are also subject to the strength or weakness of the colony, the presence of *Nosema*, *Varroa* mites, miticides and environmental pollutants.

Queens are part of a democratic hive, where every bee votes, including the queen. The queen was selected by the worker bees to head the colony, but she is not in charge; colony decisions are made by majority agreement. The bees collectively determine when it is appropriate to produce swarms cells, and when it is necessary to replace the current queen with a new one. There is good evidence that the trigger for cell production is a reduction in the level of pheromone production *as measured by each bee*. So when the colony is large and populous, the amount of queen pheromone is diluted, and swarm cells are produced. Or when the queen is failing and her pheromone production drops (apparently to about half her potential level) then the bees produce queen cells that we call supercedure cells.

Part of the queen pheromone's effects on the worker bees works as a controlling suppressant on the production of cells, so when the pheromone is diluted, then the inhibition is reduced and the cells are produced, either swarming or supercedure. There are frequent reports of swarm cells located on the edge of the frame resulting in colony supercedure. Also, the reverse occurs, where the supercedure cells result in swarming. From that we conclude that the location of the cell is not as important as the colony's overall state as influenced by population and incoming food supplies.

We must learn to think like a bee. BC

Hear Dr. Connor, Dave Mendes and Randy Oliver discuss the issue of queen self-sufficiency and related topics at the Southern New England Beekeepers Assembly in Hamden, CT on November 21. Register on line using PayPal at www.wicwas.com. Connor's new book, Queen Rearing Essentials, is now being reviewed and is scheduled for release in early 2010. Wicwas Press, 1620 Miller Road, Kalamazoo MI 49001, ljconnor@aol.com; www.wicwas.com.

Rule Out Robert

Ann **Harman**

He doesn't need to be at *every* meeting, you know.

Henry M. Robert, U.S. Army

It's the second Monday of the month and the East Cupcake Beekeepers Association is about to start its monthly meeting. Right now some of the members are sitting there wondering why they came; others are sitting at home being glad they did not attend; and the beginning beekeepers (from last spring's class) are deciding not to bother coming next month.

Yes, there seems to be a problem. Let's look at the program for tonight. Open the meeting with business. Usually a business meeting means words from the President, secretary reading minutes, report from treasurer, reports from committees, committees with nothing to report, each with motions and discussion. The clock ticks away Very little has changed from last month. Actually very little has changed in months. So does every meeting have to start with a business meeting? Does a business meeting really have to occur every meeting?

It is time to take a good look at meeting programs. This club needs to lure the reluctant members to the meetings. In addition, this club needs to make the new beekeepers feel welcome and to offer a reason for them to attend and become enthusiastic beekeepers. Most local and state associations wish to provide a program with beekeeping education along with a social time. However, the meeting programs of the East Cupcake Beekeepers seem to have fallen into a rut.

Let's start rethinking meetings with the needs of beginning beekeepers. The East Cupcake Beekeepers had a great beekeeping course in late Winter It would be nice for the club to give each student a year's membership in the association. Of course it would be up to the club to consider the finances of the memberships. In some cases a free membership may not be possible.

Beginning beekeepers always have questions. But in the climate of a meeting, surrounded by experienced beekeepers, they could feel intimidated asking what they feel to be a "stupid" question: "How can I tell if my queen died?" "When should I feed my bees?"

Here is where a club can consider having a beginning beekeepers discussion group from 6:30 to 7:30, before the regular meeting starts. This session could bring together the new beekeepers, their mentors, and a rotating panel of three experienced beekeepers. Seasonal management topics can be discussed so that the beginning beekeepers are on the right track. Books recommended to beginning beekeepers frequently do not take into consideration climate differences. April tasks in Maine are a bit different from April tasks in Mississippi.

This pre-meeting beginner's program should be designed so that their questions can be answered without the "stupid" label attached. At the same time these new beekeepers will begin to realize that some questions may not have one cast-in-concrete answer Their questions do not have to be seasonal either The new beekeepers can plan the topics to be covered in their sessions. Above all, keep the pre-meeting program flexible. Some of the experienced beekeepers may wish to start attending these programs. Watch out! It is important for these first-year beekeepers to feel free to discuss very basic beekeeping information.

The clock says 7:30 so it is time to start the regular meeting. Keep this word in mind throughout the year – variety During the course of a year there are really many ways a meeting program can be different from the usual business, speaker, refreshments routine. Let's explore a few. Undoubtedly you will think of others.

Meetings that are held during the daylight saving time months mean that the sun is still shining brightly at 7:30. Outdoor activities can take place for the first part of a meeting. Have some fun! Have a smoker-burning contest. You will have to set some rules at the previous meeting: can the contestants use their favorite fuel, how many puffs at the end of the timing period, who will be timekeeper? Start the contest promptly at 7:30, leave smokers lit for a specified time. Give the winner a small prize. Then put smokers out and go to the meeting room for a short program.

Beekeepers are wonderful gadgeteers. Have a homemade beekeeping gadget display or a homemade beekeeping gadget contest. A variation on this could be a "guess what this gadget does" contest. Members could write their guesses down on a slip of paper and the closest use wins. Ties could be broken with a coin toss or all ties proclaimed winners. The gadget maker then describes what the gadget does and why it was made.

Does someone in the club like to take photographs of bees doing things inside the hive? Perhaps five or more of these could be put on display at the beginning of the meeting with the question "what's going on here?" The members could all have a good look and decide the answers. This can become a contest or become topics of discussion as the meeting program.

With many people using the simple digital cameras, have everyone take a photo of bees or their apiary and bring a print to the next meeting. These can be for a contest. But they can also be used as the program – compare different hive stands, why are hives painted all sorts of crazy colors, see different styles of bear fences.

A whole or part of a program can be "Stump the Experts." Select a three- or five-person panel of "experts." Questions to be tossed at the experts can be thought about in advance and brought to the meeting or they can originate at the meeting. Questions can range from "what do the initials L. L. stand for in Langstroth's name?" to "explain thixotropic honey and give an example." The Stump the Experts panel can have seasonal, historical, or general themes. Many variations exist, but make it fun as well as informative.

The East Cupcake Beekeepers Association usually has about 30 to 35 in attendance. But the West Gumshoe Regional Beekeepers Association is much larger with about 100 or so at each meeting. Depending on the meeting venue it would be possible to have two or three concurrent sessions. One could be designed for the beginning beekeepers, one on a specialized topic such as genetics and a third on seasonal management.

True, sometimes given the choices of concurrent sessions a beekeeper wants to go to all, whether two or three – now what? With one of the sessions particularly designed for the new beekeepers, the experienced ones are then left with one or two choices. If one of the choices is very specialized and one very general, the topics, or related ones, can be repeated sometime during the year After all you do have a year's programs to fill.

Favorite books can be a part or whole of a meeting. Ask everyone to bring a favorite beekeeping book to the next meeting. Depending on the assortment of books you now have an assortment of speakers, each describing why the book is the favorite one. Duplication? Certainly but each reader may have a different reason. Someone brought a book that he/she considered simply awful. That's fine; include it in the discussion.

Encourage everyone to go home and clean out their beekeeping equipment storage and have a White Elephant sale. Ask for donations of bee stuff and have an auction.

Wait a minute. What's happened to the business meetings? Go back and rethink all the business and then think about what is really essential. Essential for the beekeepers is education – how to be a better beekeeper Endless monthly treasurer's reports can be consolidated into a once-a-year report, unless a problem arises. Secretary' reports consisting of time meeting opened, title of program, time meeting closed can be dealt with in different ways. If a newsletter exists, whether large or small, whether sent e-mail or snail mail, it can have the program in it. Enough said. No newsletter? The members can decide whether they want a newsletter or not. It can be a simple meeting announcement giving the program or a multi-page one with current news also.

What will Robert say about not being invited. Let's find out.

Other issues may well arise in the course of a year Dues need to increase to take care of postage increases. Problems with the venue appear Will there be a picnic at Beekeeper Burt's in July? Is anyone going to help at the county fair? Every club has election of officers. Sift through the topics that can be discussed among the officers. Let the officers explore the questions and problems and possible solutions. Now the officers have a good reason to call a business meeting.

Presenting some thought-out facts to the membership makes a business meeting efficient. Dues are not covering expenses. Dues need to be raised $2.00 per member to cover expenses. Beekeeper Burt will be delighted to have the picnic in July except on the weekend of the 4th. Our meeting room will be repaired and painted during the week of our next meeting but the library, just two buildings away, will be happy to have us meet there. Last year's country fair helpers have been contacted and all but two can help this year

Now let's see what are merely quick announcements at the beginning of a meeting and which are truly business meeting material. Quick announcements: next meeting at library, urge participation at county fair and pass around sign-up sheet. Requiring business meeting: election of officers, raising dues. What about the picnic? Well, if an official vote is necessary, then open a business meeting. If not, then just an announcement citing "the usual third Saturday afternoon."

What will Robert say about ignoring his Rules of Order? Nothing at all. Your club has had the appropriate business meeting following his outline. Or maybe not. If you have a constitution or bylaws that state meetings will be conducted according to Robert's Rules – change it to something like 'Official Meetings will ', and announce when 'Official' meetings will be held. Otherwise, it's your program, run the way you want. Your attendance at meetings has increased dramatically and the new beekeepers are enthusiastic and willing to participate. Congratulations to the East Cupcake Beekeepers Association for the improvements made. BC

Ann Harman is a beekeeper and meeting planner from Flint Hill, VA.

A Long Hive

Tom **O'Brien**

The idea of a long Langstroth on legs (LL, long lang) came as a result of studying Top Bar Hives (TBH). It came to me eventually that such hives are not really my idea of trying to make beekeeping pay for itself. (For a long time I have toyed with the idea of making our 100 acre farm a profit making enterprise. Go ahead, wish me luck!)

From studying TBHs I saw that hives on legs with plywood bottoms meant no mice and no skunks to bother the bees. I read too that TBHs allow for more space and very little swarming and queen-cell building. (Just the idea of NOT having to lift full and heavy supers appeals muchly to this out of shape retired Chemistry Teacher.) While inspecting hives, the "long lang" allows the beekeeper to stack frames and supers temporarily above the ground and not having to do excessive lifting of heavy boxes.

My "long langs" are 42 inches long and "rabbeted." The lumber is nine and five-eighths inches wide. Twenty-seven deep Dadant frames hang comfortably from one end to another when using self spacing frames. To me, that means the equivalent of three deep Langstroth supers that rest 22 inches from the ground and are easily inspected with the removal of the plywood roof. There is less disruption by only removing the long roof and not wrestling with heavy supers loaded with brood and pollen and honey

Too much space was allowed between the frames which allowed the bees to produce much brace comb. That was corrected late in the honey flow but the damage was done. The bees eventually filled all frames which again showed they will work laterally

The front entrance is a pair of drilled out side by side three-quarter inch holes four inches from the top. The plywood roof is slid back one and a half inches. This has provided the bees with plenty of space and air circulation.

The first frame is not next to the front end "plate" and that space is a vestibule that allows the bees to enter and leave as they wish. A landing board was attached to the front plate which helped the bees enter and leave the hive. Frame one is close to the entrance at the hive front and frame 27 is at the rear The rear end plate has one drilled three-quarter inch hole four inches below the top. During Winter the tar-papered roofs will cover all frames and the entrance-exit holes will be reduced to allow for air circulation and the removal of water vapor

Eighteen frames of Italian bees, with queen, were installed on May 15 and came from a beekeeper-hive inspector two hours east. (There are no hives within 50 miles.) The bees took to their new long Langstroth hive without any problems except for the tell tale too little space problem and bearding which was rectified by filling the hive to maximum with deep Dadant frames loaded with foundation.

The queen laid eggs and the workers deposited pollen and honey up to and including frame 21 which means the bees moved laterally Frames 22 to 27 were full of honey

by September one.

Honey production in July was hindered with too much rain and chilly days. However the red and white clover with some alfalfa and alsike was plentiful in the five acre goat pasture. Plenty of brood and larvae were seen in the three July inspections.

July nine was the day a slice of plywood was cut from the roof and a medium super was placed above frames one to 10 which were loaded with brood.

We had at least 25 days of hot and sunny days beginning August one. Ten full medium frames of honey were harvested on August 28.

Absolutely no swarming and no queen cell production are the two primary observations. There was good queen and bee lateral movement observed. All 27 frames were covered with bees on September one.

The building of long langs was not all that difficult for this non carpenter The rabbets were cut out by a local cabinet maker He made sure both long boards were the same length. Nine inch pieces of two inch strapping were nailed three quarters of an inch from the end of each 20 inch end board. Using the strapping as a guide, straight and square corners were achieved at all four corners. Twenty-eight inch legs were attached to the end boards at all four corners which put the top bars of the Dadant frames about 30 inches above ground.

The roofs were molded by temporarily attaching one by three inch strapping level with the tops of each long board. Three-eighths inch plywood was then attached to the strapping. The roofs fit well and none blew off.

Next year's Long Langs will be five feet long as I believe putting more bees in the hives will result in more honey in the supers stacked above the brood on frames one to 10. A partition board will be used to compress the bees into a smaller space below the added supers. That idea is common in producing comb honey

*it is not my intention to re-invent the Langstroth Hive, which is the workhorse of beekeeping, this concept may help others like me who are intent about producing honey without heavy lifting and disturbing bees unnecessarily BC


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The Evolving World Of Pollinators In America

Ross **Conrad**

The recent finding of an American honey bee is evidence that honey bees naturally populated North America at one time. For some reason all the members of this particular species of bee, *Apis nearctica*, died out.

It appears that North America was at one time the native range of the honey bee (genus: *Apis*). Fossilized evidence of America's native honey bee was unearthed in Nevada's Stewart Valley and published in the May 7, 2009 issue of *Proceedings of the California Academy of Sciences* (**http://research.calacademy.org/research/scipubs/pdfs/v60/proccas_v60_n03.pdf**). The honey bee remains, identified by paleontologist-entomologist Michael Engel of the University of Kansas, is estimated to be approximately 14 million years old. Definitive confirmation that the fossil is indeed a honey bee is revealed in part by distinctive traits unique to honey bees: specific wing vein patterns, barbs on its stinger, and hairy eyes. That's right, hairy eyes. This was news to me too. Turns out that the honey bee's compound eyes are made up of thousands of light gathering and sensing structures called ommatidia. Apparently there are tiny hairs that grow around the surface edges of each ommatidium. It is believed that these hairs are sensitive to wind speed and assist the bee in measuring the flying distance to foraging areas. Anyway, researchers involved with this fossilized discovery have named the ancient honey bee, *Apis nearctica,* and say that it looks closest to another extinct honey bee, *Apis armbrusteri Zeuner*, from southwestern Germany

A. nearctica is far from the oldest honey bee ever found. The oldest known record of a fossilized bee is approximately 100 years old and was discovered in Burma in 2006 embedded in amber *A. nearctica* is however, the oldest known bee in America. Prior to this finding it's been believed that the honey bee did not become established on the North American continent until 1622 when English colonists brought bees with them on their journey to the New World. Former U.S. President Thomas Jefferson wrote in his *Notes On The State Of Virginia* that the native American Indian population referred to the honey bee as the "white man's fly " Sightings of this unfamiliar insect provided advance notice to the native population that white settler's were encroaching on their territory

The recent finding of an American honey bee is evidence that honey bees naturally populated North America at one time. For some reason all the members of this particular species of bee, *A nearctica*, died out. As a result, the plant life and pollinator population on the North American continent evolved over the past 14 million years without the evolutionary pressure that the honey bee brought to bare in Europe, Asia, and Africa. Hence the native flora have developed and evolved in response to pollinators *other than* honey bees.

During discussions and presentations on keeping bees organically, questions inevitably come up concerning the wisdom of keeping non-native European honey bees in North America. As individuals who are committed to acting as stewards of the bees and the earth, the inquirer will say, are we

Most of the beekeeping industry's attention has been on breeding honey bees that are adapted to this new world, and we have not given equal attention to the fact that the pressure for adaptation moves horizontally, as well as vertically.

not causing additional stress to the native pollinator populations by helping to perpetuate the existence of a foreign pollinator species, the European honey bee, here in the U.S.?

It is certainly true that the limited number of foraging plants in any given area, is only able to support a certain number of pollinators adequately. Move in a hive of honey bees containing about 30,000 individuals and there will be considerably more competition for nectar and pollen sources between the bees and the native solitary bees, butterflies, etc. This manifests itself in beekeeping when too many hives are placed in one location. In this scenario none of the hives are able to produce significant amounts of excess honey. Reducing the number of hives may allow for excess honey to be collected depending of course on the cooperation of the weather, nectar flows, health of the colonies, etc. When talking about European honey bees versus native pollinators however, things are not always quite as clear cut.

The flowering plants in North America evolved in tandem with native pollinators so that the physical features of each work together for their mutual benefit. As a result, native pollinators tend to be able to pollinate many native flowering plants much more efficiently than honey bees. However, the most populous native bumble bee colonies will only number about 250. The honey bee makes up for its individual pollinator inefficiency through numbers by establishing hives consisting of tens of thousands of individuals.

Through competition amongst themselves the plants have adapted by creating colorful blossoms that give unique aromas to attract bees and other pollinators. They have learned to make their nectar available at specific times of day in order to grab the attention of pollinators. For example: buckwheat blossoms will produce nectar in the morning, but not in the afternoon. Sunflowers will produce nectar around 6:00 a.m. in the morning and then again around Noon. Honey bees and other pollinators learn the nectar secreting schedules of the various plants and will show up right on time.

Since the European honey bee is not native to North America, the nectar in many native flowers is located too deep in the blossoms for the honey bee to access fully. For example, the honey bee's proboscis is too short to reach to the bottom of the florets that make up our native red clover blossoms, but these florets are just the right depth for the longer tongued native bumblebees. Bumblebees are also better able to thermo regulate their body temperature than honey bees and are therefore able to fly at temperatures that are typically too low to sustain honey bee flight. Many pollinators native to America such as the bumblebee are larger than the honey bee which makes it easier for them to fly in the rain or cool temperatures, while the honey bee will tend not to fly during inclement weather. Such adaptations by various native pollinator species allow them to forage for nectar during times when the honey bee is unable to do so, giving the natives an edge when weather conditions are marginal. Since many predators that feed on native pollinators will also eat honey bees, moving a hive of honey bees into an area where there is heavy predation pressure on the native pollinator population will help relieve that pressure as the predators shift much of their hunting activity to honey bees. As a result of all this, any benefits or harm, that may occur to native pollinator populations when honey bees are brought into an area are often hard to pin down and subject to the unique local conditions.

The reintroduction of the honey bee into North America by Europeans has resulted in the native plant and pollinator populations adapting and changing in response to their presence. At the same time successive generations of European honey bees are adapting to the environment here in North America. Tracheal and *Varroa* mites, Small Hive Beetles, Africanized honey bees, new viruses and diseases, the ongoing build-up of environmental and agricultural toxins, and changing climatic conditions all are pressuring our honey bees to adapt, or die.

Most of the beekeeping industry's attention has been on breeding honey bees that are adapted to this new world, and we have not given equal attention to the fact that the pressure for adaptation moves horizontally, as well as vertically. Evolving diseases, viruses and mites all add to the unpredictability of each season we spend working with our bees. Much discussion at this year's Eastern Apicultural Society meeting focused on the increasing likelihood that as virulent *Varroa* mites kill off their host colonies they will tend to destroy themselves in the process. This creates selective pressure upon the remaining *Varroa* population for a preponderance of mites that are less virulent to the bees and are more likely to be able to co-exist with them within the hive.

The importance of adaptation in the current challenging climate of beekeeping must not be lost on the beekeeper As the speed of adaptation picks up we must learn to roll with it, or risk losing our bees and in some cases, our livelihood. For many long-time beekeepers this means considering doing things differently from how things have traditionally been done in the past such as replacing solid bottom boards with screens, or reducing, or eliminating the use of toxic chemicals and antibiotics in the hive. In the brave new world we find ourselves in, some beekeepers may find that they will have to adapt the size of their beekeeping operations to a smaller, more human scale. As labor saving chemicals and drugs become less and less effective and machinery becomes more costly to maintain and operate, the number of colonies they manage will have to more closely match the number of people available to adequately look after those hives using more individualized manual methods.

Beekeepers are no longer able to conduct their colony management duties based upon the calendar alone. Both the bees and the climate are changing. As a result, the bees' activities at various times of year are shifting. Successful beekeepers will have to adapt by keeping closer tabs on what their bees are up to and adjust their management to the bees' needs at the time, rather than simply conducting a manipulation or treatment around a certain date because, "that's when it's always been done."

In the past decade, I have adjusted my harvesting date earlier in the season so that I could treat my bees early enough to reduce the level of *Varroa* mites so that the hives would be healthy enough to raise healthy winter bees that would survive the long winter season. This year's abnormally cool and wet Summer resulted in a greatly decreased honey crop. It wasn't until mid-August when I was harvesting this year's honey that the Summer's weather finally changed and a pattern of hazy, hot, and humid days set in. This weather pattern tends to be ideal for kick-starting the honey flow here in the Champlain Valley region of Vermont. My continuous observations and hive inspections seem to indicate that for some reason the level of *Varroa* in my colonies was not as high this year as had been the case in previous seasons, so I took a chance and placed additional honey supers on my hives while putting off my usual mite treatment for an additional three weeks. As a result, I increased my honey harvest by about 20 percent. While it will be April before I know for sure how well the bees will overwinter, my experience is an example of what I believe are important aspects of what will define beekeeping in the 21st century We must take the time to simultaneously keep a close eye on the constantly changing environment in and around our hives, and at the same time be flexible enough to adjust to the conditions we find as they arise, rather than mold the bees' needs to fit into our schedule.

With the recent discovery of the first all-American honey bee, we are left wondering what challenges America's native honey bee found itself confronted with 14 million years ago? What was it that resulted in *A. nearctica's* inability to adapt to the prevailing conditions of its time and survive like its European, Asian, and African cousins? Some might speculate that it was an ancient form of CCD, while others may argue that it was the inability to change and adapt fast enough that drove *Apis nearctica* to extinction. Indeed, Dr Engel et. al theorize that it was the changing climate during the time that *A. nearctica* was winging its way among America's blossoming plants that contributed to its decline. The more we can learn from our past and apply that knowledge to our present situation, the less likely that we and our bees are to relive the fate of those who came before us. BC

Ross Conrad, author of Natural Beekeeping, *regularly conducts organic beekeeping workshops, classes and consultations in between taking care of his own bees.*
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Small Trees For Bees

Conn e Krochmal

Small trees are always a good choice for the bee garden.

Small trees are always a good choice for the bee garden. A wide number of species are 15 to 30 feet or so in height. Here are some recommended bee trees for those with limited garden space.

Dogwood (*Cornus spp.*)

Among the dogwoods are several small, vigorous fast-growing trees. Most have opposite leaves, up to 4½ inches in length. These can turn vivid colors during the Fall.

Dogwood flowers are often white, but can be pink. Generally, these often appear in May and last for several weeks. The bright red fruits are drupes, which usually ripen in small bunches.

Dogwoods grow in full sun and partial shade. Though they're adapted to most soil types, they prefer a moist, well drained spot.

The native flowering dogwood (*Cornus florida*), which is native to the East, has been under attack in recent years from a disease called anthracnose. This can kill the trees. Resistant cultivars are recommended. The size and hardiness of these cultivars can vary greatly, so read the catalog descriptions.

Cornelian cherry (*Cornus mas*) is 15 to 25 feet tall and up to 20 feet wide. It has exfoliating bark. The yellow blooms open especially early - in March. They last for about three weeks or so. These appear before the leaves unfurl. The edible, red fruits ripen in July This tree thrives in zones five through eight.

Kousa dogwood (*Cornus kousa*) can reach 22 feet in height with a spread of 15 feet. This species is noted for its attractive peeling bark. The white blossoms emerge in mid-June – slightly later than those of most dogwoods. The edible fruits resemble strawberries. Kousa dogwood thrives in rich, well drained, acid soils. This is recommended for zones five through eight.

Pagoda dogwood (*Cornus alternifolia*) is native to the East. This tree is 20 feet tall and about as wide. The leaves often form swirls towards the ends of the stems. The scented, whitish-yellow flowers open in flat-topped clusters. The fruits are blackish-blue. It is recommended for zones four through eight.

All dogwood blossoms provide bees with nectar and pollen.

Golden-rain-tree (*Koelreuteria spp.)*

There are two species in cultivation. Needing full sun, these deciduous trees prefer a fertile, moist, well drained soil. Golden-rain-trees are very adaptable, and will tolerate wind, alkaline soils, air pollution, and drought.

Golden-rain-tree (*Koelreuteria paniculata)* is also called pride of India and varnish tree. This rounded tree can reach 25 feet in height with a matching spread.

Up to three inches long, the alternate, pinnately compound, toothed leaflets are egg-shaped. An entire leaf can reach 1½ feet in length. Opening in June and July, the small yellow, bowl-like blossoms appear in 12-inch-long clusters. The capsules ripen to brown, and are several inches in length.

Cotinus

Thriving in hot, dry Summers, it is suited to zones five through nine. There is a columnar form of this species, known as Fastigata, which is 25 feet tall and only six feet wide.

Koelreuteria bipinnata is similar to the other species. It is 30 feet tall and around 25 feet wide. This has twice pinnately compound leaves that are over 1½ feet in length. Each leaflet is up to four inches long. These are medium green.

Viburnum lentago

Redbud

This species begins flowering a few weeks later than its relative. The yellow blossoms have red spots. The flower clusters are a foot in length. These open during the Summer, and continue into Fall. Slightly less hardy than the other species, this is best suited to zones six through nine.

Golden-rain-tree flowers provide bees with nectar

Mountain ash (*Sorbus spp.*)

Related to fruit trees, there are several small mountain ash species. These need a well drained soil. Most species tolerate a range of pH levels.

American mountain ash (*Sorbus americana*) reaches 30 feet in height with a spread of 20 feet. The pinnately compound leaves are 10 inches in length with about 15 oblong leaflets. These are pale green with toothed edges. They turn red or yellow in the Fall.

The white blossoms open in late Spring and Summer These form crowded clusters that are nearly six inches wide.

One-fourth inch or so in diameter, the berries ripen to reddish-orange. Native to the East, this rounded tree is recommended for zones three through eight.

Kashmir mountain ash (*Sorbus cashmiriana)* has a spreading crown. This is 20 feet tall and 15 feet wide. The compound leaves can reach two feet in length. The lance-like leaflets are eight inches long. The white or pink blossoms open in five-inch-wide clusters. The berries are white. This species is best suited for zones five through seven.

Honey bees collect nectar and pollen from mountain ash blossoms.

Purple osier willow (*Salix purpurea*)

This species withstands windy conditions. Preferring full sun, it adapts to a range of pH levels. This does well in wet spots. Purple osier willow fails to thrive in shallow soils. This is recommended for zones three through nine.

Up to 15 feet tall with an equal width, this upright, rounded tree has fine textured, arching branches. The young stems are tinged with red or purple.

The oblong, slender leaves can be opposite or alternate. Up to four inches in length, they're deep green or blue-green above and paler on the underside.

The slender catkins, over an inch in length, are greenish-silver with purple anthers that change to yellow. These open from early to mid-Spring.

This tree brings nectar and pollen for bees.

Redbud (*Cercis spp.*)

Members of the legume family, redbuds need full sun or partial shade. They prefer a deep, moist, well drained soil. Adapted to a variety of pH levels, they dislike wet spots. When planting, use young plants as larger trees don't transplant as well.

A number of redbuds are 30 feet or less in height. They have alternate foliage, which is often heart-shaped.

The pea-like flowers open in the Spring either before or after the leaves unfold. Lasting about three weeks or so, they appear on the previous year's wood in short clusters. On older trees they can emerge on the trunk. The fruits are flat, bean-like pods.

Eastern redbud (*Cercis canadensis*) is 30 feet tall with a matching width. The blossoms are usually purple, pink, or deep crimson. There is also a variety with white blooms. Some varieties have variegated foliage. Forest Pansy has purple leaves. This species is recommended for zones four through nine.

Chinese redbud (*Cercis chinensis*) is 20 feet tall and 15 feet in width. The blossoms are pinkish-lavender to dark pink. It does best in zones six through nine.

Western redbud (*Cercis occidentalis*) reaches 15 feet in height and is nearly as wide. Its kidney-shaped, blue-green foliage is four inches in length. The blossoms are deep pinkish-purple. It is suited to zones eight through 10.

Redbud blossoms provide bees with nectar and pollen.

Red buckeye (*Aesculus pavia*)

Buckeye needs a deep, rich, moist, well drained soil. It blooms better in full sun, but will tolerate some shade. This is recommended for zones five through 10.

Typically 10 to 20 feet tall and equally wide, red buckeye is native to the Southeast.

The opposite leaves are palmately compound. Up to 5½ inches long, they're slightly smaller than those of other buckeyes. These have five to seven, shiny, deep green leaflets. They drop early in the Fall.

Red buckeye is named for the red, cone-shaped flowers, which are relatively small, 1½ inches long. These have five petals. From late May into June, they appear in short, erect

Mountain Ash (Sorbus americana)

panicles that are six inches long.

The buckeye fruits ripen in October, and are smooth skinned.

During early Summer red buckeye blossoms are good sources of nectar and pollen.

Smoketree (*Cotinus spp.*)

Several species are in cultivation along with many cultivars. Smoketrees prefer a reasonably rich, moist, well drained soil. They grow well in full sun and partial shade. Those with purple foliage need full sun.

Related to sumac and poison ivy smoketrees have alternate, rounded to elliptic foliage. The leaves become brightly colored during the Fall.

Smoketrees are named for the hairy panicles that resemble plumes. These create the smoky effect. The flowers, which open throughout the Summer, are small – only one-eighth of an inch wide.

Eurasian smoketree *Cotinus coggygria)* is an upright, spreading tree that is 15 feet tall and equally wide. This has alternate, oval leaves, medium to dark green. They're up to five inches in length. This species has red or pink hairs on the pedicles and peduncles, while purple-leaved cultivars display purple hairs. With five petals, the blossoms appear in panicles, up to eight inches long. Opening in June and July, the tiny blossoms are green or yellow, which fade to gray The flower color can depend on the cultivar This is hardy in zones five through nine.

American smoketree *Cotinus obovatus*) is native to the Southeast from Tennessee to Alabama. Also known as chittam wood, this upright tree can be 20 to 30 feet tall and around 25 feet wide.

The scaly gray bark is especially attractive, and forms plates. The oval, alternate leaves are five inches in length. With grayish-pink plumes, the large flower panicles can reach a foot in length. This species is especially tolerant of adverse growing conditions, including a range of pH levels, rocky and dry soils, and alkaline conditions. Recommended for zones four through eight, it does best in full sun.

All of the smoketree flowers provide bees with nectar

Viburnums (*Viburnum spp.*)

While some viburnums are shrubs, the following are small trees. Viburnums grow well in sun and partial shade. Though they need a rich, moist, well drained soil, they're adaptable with regard to pH. Keep well watered during hot, dry weather Otherwise, the leaves tend to scorch.

Dogwood (Cornus)

Blackhaw viburnum (*Viburnum prunifolium)* is a round headed, deciduous tree. It reaches 12 to 15 feet tall with a spread of eight feet. This has opposite, egg-shaped to elliptic foliage. With toothed edges, the glossy, deep green leaves are 3½ inches long. The foliage turns purplish-red or purple in the Fall.

The creamy white blossoms, an inch wide, open in late Spring. These form flat clusters up to four inches across. The spherical, blackish-blue fruits, one-half inch long, are edible.

This is native to the East from Michigan and Connecticut south to Florida and westward to Texas. It is recommended for zones three through nine.

Nannyberry or sheepberry (*Viburnum lentago*) is very adaptable. This is suited to dry and moist soils. This deciduous, upright tree with arching branches is 12 to 18 feet tall with a 10 foot spread.

The shiny, oval, deep green leaves are up to four inches in length and two inches across. The edges are toothed. These become brightly colored during the Fall.

The scented, white, tubular blooms have yellow stamens. Less than one-fourth inch wide, these open in large flat clusters, up to four inches across. They emerge at the ends of the stems during the late Spring, lasting for about three weeks.

The spherical fruits, about ½ of an inch long, ripen to blackish-blue. Clusters can contain fruits in varying shades of ripeness, including green, yellow, red, and blue. Native to the East, it is recommended for zones two through eight.

Siebold viburnum *Viburnum sieboldii*) is a vigorous tree that reaches 12 to 20 feet in height with a spread of 10 to 15 feet. This small, deciduous, upright plant has arching stems.

The opposite, toothed, glossy leaves are heavily veined with a wrinkled appearance. Reaching five inches in length, these are deep green with an egg-like to elliptic shape. They reach five inches in length. When crushed, they give off an unpleasant odor

The tubular, white blossoms emerge in late May and conceal the leaves. One-fourth of an inch wide, they appear in rounded or flat clusters that are six inches across. These occur at the ends of the stems. The ovoid fruits, one-half inch in length, ripen to black in the Fall. This is recommended for zones five through eight.

Viburnum blossoms are excellent sources of nectar and pollen for bees. BC

Connie Krochmal is an award winning garden writer and a beekeeper in Black Mountain, South Carolina.

Honey Bee Stocks, Genes, And Varroa Resistance

Roger Hoopingarner

To be successful we have to *continually* select our bees in the direction we want the stock to go, or continually purchase queens from one of the breeders that has done the selecting.

One of the more intriguing aspects of honey bee biology is their mating behavior, where the virgin queen flies some distance from the hive to mate. This behavior was selected over time to enhance the genetic fitness of the colony Normally, a virgin queen will fly out from the hive on warm afternoons for three or four days in a row, if weather permits, and during each of these flights mate with one to several drones. The consequences of this mating behavior are profound not only to the queen's own colony but to the survival of the species as well. If the mating period is interrupted or shortened, such that the queen does not mate with several drones, the queen will be able to lay eggs for a shorter interval of time. This period for egg laying may be only months and not a couple of years – fewer matings means less sperm in her spermatheca and, thus, she runs out of sperm earlier in her life. If she mates with fewer drones, the genetic diversity of the colony may also be compromised by limiting the effective number of worker subfamilies.

The distance that the virgin queen bee flies to mate probably varies greatly with the topography of the landscape, weather and possibly the race of bees. Many years ago, by using genetic markers, Dr Donald Peer tested the distance that queens (and drones) were capable of flying to mate. He had some mating where the combined flight distance (queen + drone) was six miles! The advantage of this behavior is that it would enhance the chances of meeting with drones of different genetic makeup – a natural out-crossing.

With these background facts about honey bee mating behavior, where does that take us concerning honey bee stocks, your particular colony or apiary, and the prospects of genetic resistance to *Varroa* mites? With honey bees the concept of stock, or lines, becomes very much blurred. For example, if you raised several new queens from a particular colony and had them all mate from the same mating yard, the variable number of drones that might mate with the queens, as well as the diversity, makes for tremendous variation. Some queen breeders try to overcome some of this variability by saturating their mating areas with known drone-mother colonies. Their success in this venture probably hinges on continuing the saturation for several years in which time the gene pool over a wide area becomes "fixed" with their stock. (Remember the distance figure I cited above.) For most of us we cannot talk about our honey bee stock the same way that a cattle rancher or a dog owner can. However, we can select our bees in a certain direction, and over time, we can affect the gene pool that surrounds our colony or apiary To be successful in that venture we have to *continually* select our bees in the direction we want the stock to go, or continually purchase queens from one of the breeders that has done the selecting. Even with purchased queens, you will find some backsliding from your goal (at least for a few years) because of unknown queen supersedure.

Let us now go to genetic resistance to *Varroa*. This is the direction I am convinced the beekeeping industry must go, yet is having so much pain in achieving even limited success. Why are we having so much trouble? I think it is because we have not understood the time and effort it takes to saturate a beekeeping area with the resistant genes so that every supersedure queen that

> **The most important part is that you must keep this up for several years until the genes for resistance are completely incorporated into the gene pool of all the colonies within mating range of your apiary**

leaves a colony to mate, will only find drones that carry the resistant genes.

I once asked Dr Marla Spivak how long it would take to "fix" the genes for hygienic behavior into a stock such that every queen that was mated would always be hygienic. Her answer was that for a group of Minnesota beekeepers (I think six), who were jointly raising their own queens in a southern mating location, it took six years. Yes, six years! Yet when I talk to beekeepers about using VSH (SMR) or Russian queens the common answer is, "I thought they might be a little resistant, but they became infested with *Varroa* in the second year " Then, if you ask them if the queen was marked for identification, the answer is always no. Yet we know that queens are being superseded much more rapidly now than previously, or so it seems. The rapid supersedure may occur because of *Varroa* stress or maybe we just were not looking before. (Queens may live two or three years, but most of them do not.) If the beekeeper has not saturated the colony's mating area with resistant genes, any supersedure will usually result in a queen that does not carry the genetics the colony needs to be completely resistant to *Varroa*.

Back in the early 90's when Dr John Harbo and I were working on developing bees resistant to *Varroa* (which eventually became the VSH strain) we had long talks about developing a "stock" of bees. There were two concerns. The first was that if we were very successful many of the honey bee colonies in the U.S. would all have the same genes, and breeding history from other plants and animals told us that such a pattern was not healthy for the bee industry The second concern was that if we were going to select for all the traits necessary for a good stock then we would have to spend many more years in developing the strain. Our goal was not to develop a stock, or strain, but to have bees that would have the genes that every beekeeper could incorporate into their own stock – stock that they would have selected for production in their own particular area or location. I do not think John or I envisioned how hard that concept would be to "sell" to beekeepers.

So how should a beekeeper accomplish the incorporation of resistant traits into their bees? First, you need to buy a sufficient number of queens that have the VSH genes such that most of the drones flying from your apiary will carry resistant genes. Second, keep track of all queen supersedure. The best way to do this is to color mark the queen, or clip one of her wings. Then select those colonies that meet your criteria for honey yields, gentleness and low *Varroa* counts. A colony resistant to *Varroa* will show low population growth of *Varroa*. That is, if you take a sticky board count, or an ether roll count, every three weeks, the number of mites should increase very slowly – if at all. Because of supersedure of the queens, plan on buying more VSH queens the next year The most important part is that you must keep this up for several years until the genes for resistance are completely incorporated into the gene pool of all the colonies within mating range of your apiary Of course, this process would proceed much faster if all the beekeepers in your area did this selection at the same time. Beekeepers can wait and nature will do the selecting for them though this may take many years. (The process will be even slower if beekeepers continue to treat with chemicals and thus keep diluting the gene pool with non-resistant genes.) We can speed the process up by pushing the selection via already selected stock such as VSH. The choice is yours. If you do not buy resistant stock, and do not do any selection, then plan on buying many packages and queens every year By doing the VSH incorporation into your bees the colonies will survive and the beekeeping industry will be much healthier BC

Roger Hoopingarner is Extension Specialist in Apiculture, Michigan State University, retired; and an L.L. Langstroth scholar.

Some Of The Links We Like

E-Extension Bee Health The NEW Honey Bee Health Web Page to End all Extension Web Pages. Check it out.

National Weather Service –Is it Gonna Rain?

USDA Agricultural Library – Find a book

EPA Pollinator Protection Propaganda – Have they Changed?

African Honey Bees are Where? Latest Map.

Colony Collapse Disorder – What, Where, When, How and Why?

National Honey Bee Awareness Day – August 21, 2010

Selections From The E. F. Phillips Beekeeping Collection at Mann Library, Cornell University – The Hive and the Honey Bee Collection – Find a book online.

The Pollinator Partnership – Not Just Bees

Natural Beekeeping – Top Bar Hives

Organic Beekeeping - No Chemicals, Small Cell Advocates

A beekeeping Forum, and Loads of Beekeeping Information

Follow The Almond Bloom – All Year Long

Groeb Farms – Michigan, Florida and more, Honey Packers

Golden Heritage Foods – Midwest Honey Packers

Dutch Gold Honey – East Coast Honey Packers

Find These Links & More At
www.BeeCulture.com

RIPE SUNSHINE

Granddaddy wanted
honey in a jar
with comb,
worried that bees
would no longer bluster
around summer flowers
and bombard blooms
to pimp for pollen.

I found the honey,
marmalade made
of spit and spore
sealed in a glass jar
When he lifted
it to the light,
marigolds, dandelions,
blackeyed susans
sunned his face.

Opening the jar he
dipped two fingers
into the viscous
sunshine, grinned
at the wildflower essence
that riffed his lips,
nectar of a million blossoms,
a snapshot
in the life of a meadow
He extended it.
I shook my head side to side.
That moment
was his to taste
and mine to remember

written by Jo Barbara Taylor
Raleigh, North Carolina

GLEANINGS

NOVEMBER, 2009 • ALL THE NEWS THAT FITS

FIRE AT A.H. MEYER AND SONS

A flammable solvent leak, similar to lacquer thinner led to an explosion and fire in one of the buildings at this large beeswax rendering facility in Winfred, South Dakota on Monday, September 28, 2009.

One employee was seriously injured and transferred to a Minneapolis hospital for burn treatments, and 20 firefighters spent more than two hours at the scene. They focused on cooling a large solvent tank and three propane tanks to protect them from the fire, which gutted the building.

Meyer's have had similar events in 1990, and again in 2004, according to AP. Meyer's prepares beeswax for the cosmetics and candle industries.

UC RIVERSIDE RELEASES NEW CITRUS VARIETY

A seedless (in the presence of bees) Tango variety is a seedless Murcott, which harvests in February. The seedy (w. bees) Clementine harvests in Nov., making it more attractive to growers since they can harvest the fruit before the frost season (it also provides a wider marketing window for seedless mandarins). This new variety matures in mid-December but "early Jan. to Feb." gives the best quality. So it doesn't look like its a seedless Clementine (like Tango is a seedless Murcott) but its close, and UCR is working on other seedless (in the presence of bees) mandarin varieties. With increased global warming, Dec-Jan. frosts may be less of a concern for citrus growers.

CHINESE IMPORTER GUILTY

Chinese executive Boa Zhong Zhang pleads guilty to conspiracy to smuggle goods into the United States by using false statements and to introducing adulterated foods into interstate commerce.

The Seattle Times reports the plea agreement in U.S. District Court in Seattle means the vice president of Changge Jixiang Bee Products Ltd. in Henan, China, faces up to five years in prison and a $250,000 fine when he is sentenced on Nov. 30.

Still facing trial are Chung Po Liu of Bellevue, 68, owner of Rainier Cascade and Evergreen Produce, and Yong Xiang Yan, 60, board chairman of the Chinese honey company.

Investigators say they mislabeled honey containing three antibiotics as coming from other countries to avoid antidumping tariffs.

A U.S. Department of Justice statement says Boa Zhong Zhang was accused of rerouting 21 shipments of Chinese honey worth $1.6 million to avoid $3.3 million in punitive antidumping tariffs. The honey was shipped from China to the Philippines or Thailand, where it was relabeled and sent to the U.S.

One shipment in January 2008 is believed to have been contaminated with ciproflaxin -- an antibiotic sometimes sold under the trade name Cipro.

"Submission of false customs documentation to avoid paying tariffs defrauds not only the U.S. government, but the public who is unaware of the scheme and unwittingly purchases the products," U.S. Immigration and Customs Enforcement Special Agent-in-Charge Leigh Winchell says in a statement.

Alan Harman

ABF MEETS IN ORLANDO IN 2010

Plans are well underway for the "Keeping the Hive Alive" 20010 North American Beekeeping Conference & Tradeshow, January 12-16, in Orland, Florida. As you might have guessed by the title, the conference will focus on topics related to maintaining healthy hives.

The conference, which will be hosted by the American Beekeeping Federation (ABF), in cooperation with several other industry-related organizations, including the Canadian Honey Council (CHC), the Canadian Association of Professional Apiculturists (AAPA), the American Bee Research Confeence (ABRC), and the Apiary Inspectors of America (AIA), will bring together top industry experts to discuss topics that are imperative to beekeepers of all levels.

The expanded tradeshow will open on Wednesday afternoon and remain open during conference hours until noon on Saturday. Thursday and Friday will be dedicated to general sessions, as well as the Serious Sideliner Symposium facilitated by Dr. Larry Connor of Wicwas Press. Interactive workshops will take place on Saturday morning and the conference will conclude with the ABF Annual Banquet on Saturday evening.

The Windham Orlando Resort is the host of the 2010 conference. The conference rate is $119. Visit **www.wyndhamorlandoresort.com** for more details.

NZ COMPANY SELLS SHARES IN MANUKA HONEY HIVE

A New Zealand company is offering part ownership in beehives collecting Active Manuka Honey.

New Zealand-based Your Pure Honey is selling a premium share costing US$2,500 and the buyer gets all the honey from one hive. The company says the 44 pounds of Active Manuka Honey will be supplied in 40 glass jars. There will be a customization of the beehive, with the buyers name, logo or more.

There will be live updates to a personal beehive website and the story of the beehive will be given in a photo book tailored to the shareholder.

A syndicate partnership costing US$690 gives a quarter share of a beehive, which is 11 pounds of Active Manuka Honey.

A basic share costs US$285 a season for 10% of a hive and provides 4.4 pounds of raw honey

There are only 100 beehives available.

The operation is the brainchild of beekeeper Darcy Beehre and his business partner Luke Foster.

"We're trying to provide a luxury experience that's unique and personal," Beehre says.

"Normal honey is blended to provide a flavor that's consistent, but a bit bland. Each Your Pure Honey beehive has its own unique flavor, and because they receive the product of just one hive, each of our clients will get a rich, healthy honey that nobody else has."

The partnerships will last till June 2010; taking buyers through the complete cycle of gathering honey. Buyers will own the beehive for the whole New Zealand honey season which lasts from September till May.

For the first half of the summer the hives will be in a coastal area, then they'll be moved inland to get the end of summer nectar.

All through the season buyers will get updates and photos of their beehive on a private website.

In April the company will collect the honey and package it in Italian

Continued on Page 75

STATEMENT OF OWNERSHIP

STATEMENT OF OWNERSHIP MANAGEMENT AND CIRCULATION (Act of August 12, 1970). Section 3685. Title 39, United States Code. 1. Title of publication: BEE CULTURE MAGAZINE. 2. Publication Number: 9243-80. 3.Date of Filing: October 1, 2009. 4. Frequency of Issue: Monthly: 5. Issues #12., 6. Price $25.00. 7. and 8. Location of known office of publication, headquarters or general business offices of the publisher: PO Box 706, Medina, Ohio 44256-0706. 9. Names and addresses of publisher and editor are: Publisher, John Root, PO Box 706, Medina, Ohio 44258-0706 and Kim Flottum, Medina Ohio. 10. Owner: The A. I. Root, Co., Medina, Ohio; Stockholders: Brad Root, Medina, Ohio; Cede & Co./Depository Trust Company, New York, NY; Elizabeth Judkins, Silver Bay, MN; Robert Root, Medina, Ohio; John Root, Medina, Ohio; Stuart Root, Wadsworth, Ohio; 11. The known bondholders, mortgagees, and the security holders owing or holding one percent of more of total amounts of bonds, mortgages or other securities are: None. 12. For completion by non-profit organization authorized to mail at special rates (Sec. 132-122, Postal Manual); Not applicable. 13. Publication Title: BEE CULTURE MAGAZINE. 14. Issue date for circulation data below: October 1, 2009. 15. Extent & nature of circulation: Beekeeping Industry – worldwide. 15A. Total number of copies printed (net press run); Average number copies each issue during preceding 12 months, 15,295. Actual number of copies of single issue published nearest to filing date, 15,750. 15B. Paid/requested outside-county mail subscriptions slated on form 354l: 1. Average number copies each issue during preceding 12 months, 13,320. Actual number of copies of single issue published nearest to filing date, 13,262. 2. Paid in-county subscriptions stated on form 3541: Average number copies each issue during preceding 12 months, None. Actual number of copies of single issue published nearest to filing date, None. 3. Sales through dealers and carriers, street vendors, counter sales, and other non-USPS paid distribution: Average number of copies each issue during preceding 12 months, 221. Actual number of copies of single issue published nearest to filing date, 221. 4. Other classes mailed through the USPS: Average number of copies each issue during preceding 12 months, None. Actual number of copies of single issue published nearest to filing date, None. 15C. Total paid and/or requested distribution: Average number of copies of each issue during preceding 12 months, 13,541. Actual number of copies of single issue published nearest to filing date, 13,483. 15D. Free distribution by mail (samples, complimentary, and other free). 1. Outside-county as stated on form 3541: Average number of copies of each issue during preceding 12 months, None. Actual number of copies of single issue published nearest to filing date, None. 2. In-county as stated on form 3541: Average number of copies of each issue during preceding 12 months, None. Actual number of copies of single issue published nearest to filing date, None. 3. Other classes mailed through the USPS: Average number of copies of each issue during preceding 12 months, 110. Actual number of copies of single issue published nearest to filing date, 78. 4. Free distribution outside the mail: Average number of copies of each issue during preceding 12 months, 111. Actual number of copies of single issue published nearest to filing date, 143. 15E. Total free distribution: Average number of copies of each issue during preceding 12 months, 221. Actual number of copies of single issue published nearest to filing date, 221. 15F. Total distribution: Average number of copies of each issue during preceding 12 months, 13,762. Actual number of copies of singles issue published nearest to filing date, 13,704. 15G. Copies not distributed: Average number of copies of each issue during preceding 12 months, 1,533. Actual number of copies of single issue published nearest to filing date, 2,046. 15H Total (sum of 15f and g): Average number copies of each issue during preceding 12 months, 15,295. Actual number of copies of single issue published nearest to filing date, 15,750. 15I. Percent paid and/or requested circulation: Average number of copies of each issue during preceding 12 months, 98%. Actual number of copies of single issue published nearest to filing date, 98%. 16. Publication of statement of ownership will be printed in the November 2009 issue of this publication. 17 I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanction (including fines and imprisonment) and/or civil sanctions (including civil penalties). Signed Kim Flottum, Editor.

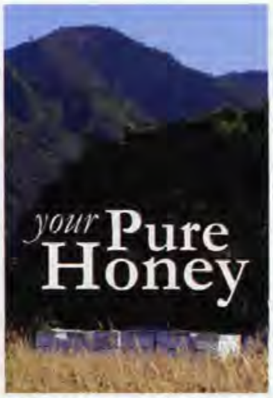
MANUKA ... Cont. From 73

honey jars and finish work on the DVD of the beehive.

"In May you'll get your own delicious and healing Active Manuka Honey, along with the DVD, photos and story, or your own book with the Premium option," it says. The company has made provision in case the beehive fails to provide the promised volume of honey.

"We're confident we'll gather at least 20 kg (44 lbs) of honey from your beehive, so with a quarter share that's 5 kg (11 lbs) for you," the company says on its website. "If we have a disaster and get less, we'll top up your share from a neighboring beehive that's been in the same locations. We think this is very unlikely to happen.

The company says if the beehive produced more, as a very small company it can't commit to sending more than 11 pounds for the fixed price.



"If you're interested in getting every bit of honey, have a look at the options with the Premium Partnership," it says.

The program also helps protect Manuka forests while providing income for local farmers by renting 2.5 acres a hive. – *Alan Harman*

THE VERY BEST HONEY IN THE WORLD!

The first ever World Honey show was held in Dublin, Ireland, in 2005, sponsored by the world beekeeping organization, Apimondia. At this honey show, there were over 400 entries, with 21 countries represented in the show. Virginia and Carl Webb of Clarkesville, Georgia, won FIRST PLACE in the world with their North Georgia mountain Sourwood honey.

In September, 2009, Apimondia met in Montpelier, France, with thousands of beekeepers in attendance. This World Honey Show represented 30 countries in the honey show. Virginia and Carl Webb from Georgia again won the GOLD MEDAL for having THE VERY BEST HONEY IN THE WORLD! This was won with their local Sourwood Honey. "Winning at the first World Honey Show in 2005 was such a blessing," Virginia said. "America has such a wide variety of nectar sources that it is amazing our honey could have been judged as the very best. "

From the Apimondia 2009 web site: "This specific contest was a professional competition that involved the expert selection of honey and the search for quality, finesse and specificity of each category of honey. However, we hope that this contest was also an invitation to the discovery of honey from around the world. Indeed, through its taste, color and fragrance, each honey unveils a part of its identity and its land"

Virginia is the past President of the Greater Atlanta Beekeeper Association and the Georgia Beekeepers Association, is a third-generation beekeeper.

The Webb's are full time commercial beekeepers and queen breeders; specialize in Russian Queens, which have been specially selected for being mite resistant.

"VANISHING OF THE BEES" DEBUTS IN UK

The world's largest consumer-owned business calls on the British government to commission research into the effects some pesticides are having on honey bees.

The call by The Cooperative Ltd. coincides with the launch of the feature film, *Vanishing of the Bees*, which outlines the decline in the honey bee population.

The coop wants everyone who sees the film to write to Environment Minister Hilary Benn MP urging him to fund research into the neonicotinoid family of chemicals.

Some studies have linked these types of pesticides to honey bee colony collapse.

The coop announced in January it was was expanding its market-leading pesticide policy and prohibiting the use of all eight of the neonicotinoid family of chemicals on its own-brand fresh produce.

The banned pesticides are Acetamiprid, Clothianidin, Dinotefuran, Fipronil, Imidacloprid, Nitenpyram, Thiacloprid and Thiamethoxam.

At the same time, it said it was giving £150,000 ($241,480) for research into the decline of the honey bee, the UK's largest ever private donation for bee research.

Last Spring the coop's farms began a three-year research project seeking to identify the optimal mix of wildflowers that can be sown in field margins and on "set-aside" land to attract and support honey bees.

The coop is the UK's largest farmer with more than 61,780 acres of land under management.

The coop's head of social goals Paul Monaghan says the alarming drop in the number of honey bees and in turn the threat that has on our food supplies is very worrying and it is essential to find out what is happening and quickly.

"The finger of suspicion has been pointed at some pesticides and in particular, the use of neonicotinoids," he says. "This family of chemicals has been linked to honey bee declines elsewhere in Europe and that is why they have been restricted in Germany, France, Italy and Slovenia. However, very little independent research into their effects on bees has been carried out in the UK.

"That is why we are calling for the government, which earlier this year announced that it had put aside £10 million ($16 million) to be used on pollinator research, to carry out a systematic review of the impact these pesticides are having on the well-being of honey bees."

Vanishing of the Bees, the latest film to be distributed by the coop is a new chapter in its Plan Bee campaign designed to help halt the fall in the number of honey bees and raise awareness of the issue. The film tells the story of the worldwide decline in bee populations and explores the potential causes behind the losses.

The coop, after the acquisition of Somerfield supermarkets, is the world's largest consumer-owned business, with more than 4.5 million members and 87,000 employees.

The food retail business is the largest division of the coop. It directly operates more than 2,200 stores of various sizes with the biggest geographical spread of any retailer.

Filmmakers George Langworthy and Maryam Henein say they were drawn to make the documentary because it encapsulates grand issues about ecology, agriculture, economy and politics in a mystery about the amazing little honey bee.

"Beekeepers and scientists are fascinating people and we really have been blessed with such generous access to their homes, their travels, their laboratories and their innermost thoughts and feelings," they say.

To find out more about this film and the film makers visit their web page **www.vanishingbees.co.uk.**

THE SCOTTISH BEEKEEPER. Magazine of The Scottish Beekeepers' Assoc. Rates from Enid Brown, Milton House, Main Street, Scotlandwell, Kinross-Shire KY13 9JA, Scotland, U.K. Sample on request. $1.

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BEEKEEPING published since 1935, by Devon Beekeepers' Association, SW England. 10 issues per year. Subscriptions outside Europe £26. Send to Brian Gant, 2 Abbey Gardens, Buckfast, UK TQ12 0EU. brian.gantWwhich.net.

ALBERTA BEE NEWS is published monthly by The Alberta Beekeepers Association, serving the interests of the beekeepers since 1933. A subscription is $35/year Sample free upon request. Send to The Alberta Beekeepers Association, 11434 168 Street, #102, Edmonton, Alberta, Canada T5M 3T9.

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LA SANTÉ DE L'ABEILLE – Fédération Nationale des Organisations Sanitaires Apicoles Départementales, 41, rue Pernety, 75014 PARIS.

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

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

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

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

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

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INNER ... Continued From Page 14

Australia, so there's nothing to worry about, nothing at all. Except, after two years, they still haven't found all those nests in Australia. If you don't know where they are, how do you know they're at least 200 miles away? Or only two miles away? How do you know the little darlings didn't hitch a ride on a truck (or another boat) and move somewhere far, far away from those diligent searchers? Really, how do you know? Am I missing something here? Am I over reacting to this?

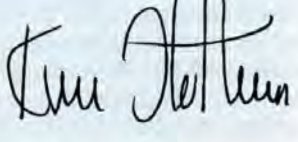
You can be fairly certain we'll hear from the Australians, assuring us that those bees have been (1)captured and are no longer a threat, or (2)really are, still, at least 200 miles from *any* package producer, and (3)they'd know the difference and would never ship any here, anyway; and, from APHIS, citing all the international trade agreements in place that forbid us from protecting our butts; and those who import and use these bees, because its legal, the bees are wonderful, and we should just mind our own business.

I know that some U.S. beekeepers simply love Australian bees...and some almond growers do too. But are we being careful enough? Thorough enough? Are we safe enough? Can we afford a new mite problem, or two, or more? Can we afford additional competition for limited forage? Aren't African bees enough of a bad-bee image problem?

The folks in Australia haven't given up trying to find every last colony of these bees. We can't fault them there. And because there was only a single initial incursion, (even though there were a lot of swarms from that initial colony), the genetics of that limited population of bees is beginning to cause inbreeding effects. So, maybe that'll solve the problem for the Australians. And us. This time.

Let's really, really hope so.

Happy Thanksgiving.



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When you see a teenage girl wearing a T-shirt that reads, "Martin Luther is my Home Boy" you know you're in Minnesota!

I was happy to be there. Just getting away from home was a relief. I was dealing with an American Foul Brood outbreak in the middle of a really nice honey flow, so I had plenty to think about and keep up with. And I wasn't sleeping.

But as soon as I got on the plane to Minnesota, my concerns melted away I was on vacation!

The occasion was Marla Spivak and Gary Reuter's three-day July queen rearing short course at the University of Minnesota, St. Paul.

When I registered for the course in March, the round-trip air fare from Aspen was $700. This seemed like a lot, but I thought, "Ed! You only go around once! Cut the Gordian knot and just do it!" I was pretty sure I wasn't going to figure out how to raise queens on my own. I owned four queen rearing books, but all reading them ever did was make my head spin. I needed a guru.

When I finally booked my flight in May, the fare had dropped to $350! Plus, I'd budgeted $100 a night for a room before I found Flo, a psychoanalyst who rented me an elegant two-room suite in her home two blocks from the St. Paul campus. Price: $45.

When Flo and I made arrangements, she said, "Don't take a taxi. Catch the #3 bus, and you can get off a half-block from here."

A woman who understands travel on the cheap. Perfect.

The course was laid-back and informative. Marla and Gary made queen rearing sound easy, which it basically is. They have a sense of humor Marla's eyes twinkle when the joke's on Gary She and I both used to work for Paul Limbach in Silt, Colorado, so we had something in common. Marla and Gary immediately felt like friends and mentors.

Grafting (scooping day-old larvae into plastic queen cups) was my favorite part, mostly because by the second time I tried it, I felt like I was getting the hang of it.

On our Saturday field day, they gave us University of Minnesota water bottles. Gary said, "Be sure and bring your water bottles tomorrow (the final day). We have a surprise for you if you do."

The surprise was hygienic-queen cells. There were more than enough to go around, so I took two. We packed them in sawdust in our water bottles. I said, "Are they going to let me on the plane with these?" and Marla said, "Oh, sure."

I never believed her

For luggage I had only a carry-on canvas mason's bag – a relic from a previous life. It's held together with a metal band and pot-metal rivets, so it always attracts attention at airport security

At the Minneapolis airport, everything stopped when my bag got to the X ray machine. The security inspector studied the bag for at least 30 seconds before he called for backup. Three gentlemen waved their arms and pointed at my bag until finally they ran it through, at which point the main inspector fished out my water bottle with the queen cells inside.

He said, "What's inside? Sawdust?"

"Yes," I said truthfully but somewhat evasively I didn't want to say "Queen bee cells," because I had no idea how he might react. Could taking bees on a plane be considered a terrorist act? Could a trained security official envision a scenario in which someone might hijack a plane with bees?

"Fly me to Havana, or I'm turning these queen bees loose!"

Remember, airport security personnel are trained to treat fingernail clippers as a potential weapon.

He said, "Do you mind if I swab this (for explosives)?"

I said sure, and in no time he was back. He handed me my University of Minnesota water bottle and said, "Thanks for your patience."

I wondered how my irradiated little darlings were doing inside their queen cells. I also wondered if I had broken the law by not mentioning the queen cells, but hey, I made it through security!

My flight to Denver took off four hours late, and I missed my connection to Aspen by minutes. That was the last flight of the evening, so Frontier put me up in a hotel halfway to Colorado Springs. By the time I got there, it was 2 a.m.

Of course the next morning I had to clear security again. This time I took my University of Minnesota water bottle out of the mason's bag and set it on the scanner belt next to my billfold. I thought maybe with no mason's bag metal rivets to sound the alarm, the water bottle might cruise through without attracting attention. But when my stuff got to the scanner, the belt stopped, and the same scene replayed itself. The inspector called for backup, and a group of inspectors waved their arms and pointed at the machine.

This time the inspector asked, "What's in here?" I gulped and said, "Two honey bee queen cells packed in sawdust." The inspector smiled and said, "Mind if I swab this?"

When I unpacked the cells at home, one queen was already chewing her way to freedom. I caged her and put her into a queenless nuc struggling with chalk brood. I thought her hygienic bloodlines might help get this hive going again. But she got superseded almost right away

As for my other irradiated little darling, she never did hatch.

Ed Colby

Irradiated Little Darlings

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