Bee Culture

2009 CALENDAR ISSUE

JAN 2009
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Our unique cover shot this month comes from the front page of the 2009 Beekeeping Calendar, taken by Wendy Booth of Nottingham, NH. We hope you enjoy our extraordinary cover, and using our 2009 calendar as much as we did in producing it.

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Bee Culture

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JANUARY 2009 VOLUME 137 NUMBER 1

FEATURES

DEPARTMENTS & COLUMNS

Cable Box Hives

Recently Cox Communications wrote in about relocating bees from cable boxes to hives.

Most significantly, bees rarely inhabited cable boxes until Africanized bees became pervasive in the area. European bees are much more particular about where they make their hives and avoid such low, small locations as cable boxes, but Africanized honey bees love them. This means the bees Cox is so carefully saving are almost entirely Africanized.

Cox cites "no more toxic chemicals" in local neighborhoods as another benefit of the plan, but the chemicals used by professionals are intensely regulated by the EPA and highly diluted. Comparatively, moving Africanized honey bees to hobbyist beekeepers' yards in residential areas poses much more serious risks to nearby families. Professional pesticide applications do not kill dogs and send people to hospitals, Africanized honey bees do.

Orange County Agricultural Commissioner Rick LeFeuvre, as well as many other county ag commissioners and professional entomologists at universities, all have publicly stated that any feral honey bees in areas of africanization should be treated as Africanized and dealt with by pest control professionals.

In conclusion, Cox's "safe and humane" idea does not benefit the honey bee population and may put families in danger.

David Marder
Laguna Beach, CA

Tulip Poplar Update

I'd like to comment on William Bartlett's questions regarding the lack of nectar in tulip trees in his area (Mailbox, September 2008).

I have been keeping honey bees in northern Harford County, Maryland for more than nine seasons. I'm currently enrolled in a wildlife and forest conservation course through Penn Foster College. This course is great, and I suggest it for anyone involved in agriculture.

Tulip trees, yellow poplar, and tulip poplar trees (Liriodentron tuliptera) range from central Pennsylvania through Georgia to the south and Wisconsin to the west. Each Spring, usually around late April or early June, the trees bloom with a yellow-orange flower resembling a tulip. They bloom for about 14 days. Each flower produces copious amounts of nectar, sometimes so much that it drips to the ground. The later the bloom, the better the nectar harvest for the bees. However, tulip trees need full sunlight and don't compete well with other trees for nutrients.

Here are a few suggestions for Mr. Barlett. First, send a soil sample to your local university for a soil test. Second, consider whether your tulip trees are crowded or in an overgrown area. Perhaps you could convince the land owner to let the woodlot be thinned to allow to the trees to flourish. Third, consider feeding the trees you're using as a nectar source to make up for any nutrient deficiencies. A few well-placed fertilizer stakes will go a long way toward helping your trees produce better. Finally, contact the USDA Forest Service and research some management techniques to help your tree perform better. Contact a forest manager there to evaluate the woodlot.

Consider taking these same steps for black locust trees in your area. It may pay off in larger honey crops. I would also recommend that honey producers seek out large stands of American Holly trees. Holly honey is water white in color and is the fastest-selling honey I produce.

These trees to us are like crops are to farmers: we just have to take care of them and our bees. I hope this has been helpful.

Bob Borkowski
Street, MD

Comb Direction

Having read both articles by Norman Carreck on 'Dance Language' I find myself agreeing with most of his statements.

In his last article (November, 2008) he brought magnetic field into the mix which brought to mind an experiment I tried several years ago.

What brought this on was when removing bees from trees and dwellings, there seems to be no rhyme or reason as to direction of comb especially in houses between the studs. Sometimes they were built at perfect right angles with the studs but mostly there was no correlation between the shape of the cavity and the direction of the comb.

I also read about how bees build their comb in a new cavity, where no comb was present from a previous colony. It said they would build it in the same direction as the parent hive, and also showed a picture of an experiment to prove this. They used a round bucket with a hole in the center of the bottom, and when a swarm was dumped in, they in fact built the comb the same direction as the parent hive, they then added a statement that kind of baffled me. They said upon changing the magnetic field so many degrees, the bees changed their comb to compensate for this change. I thought how did they change the magnetic field?

So I decided to make one of these round hives myself. I used two five-gallon buckets. One bucket was cut off about six inches from the top. This cut off portion would slip inside of the other bucket. I then proceeded to put a fine mesh screen over this cut off part and by using a large strap clamp. I tightened it around the lip of the bucket with the screen underneath, making a taught screen for the bees to build comb on and I could observe the whole procedure. I also put the lid back on so bees couldn't orient to anything. I then drilled a one-inch hole in the center bottom for an entrance.

Now I thought how can I change magnetic field? I couldn't; so the next best thing was to have the bucket rotate. So what I did was

use 50# test monofilament fish line with a swivel attached to the bucket handle. I suspended it inside of my open air wood shed. The bottom of the hive was about a foot above ground. I also put an axel to where the hive wouldn't move side ways – only turn. I also used the wind to turn my hive by placing three vanes made of thin plywood placed evenly on the side of my bucket hive.

I then got my swarm about three or four pounds, plugged the entrance hole, removed my cut off screen top bucket and dumped them in replacing everything, and put the lid back on. I then opened the entrance hole, and watched.

The wind did a fair job of turning the whole hive some times almost too fast but mostly slow. With this turning my bees would have no idea where north was. At least that is my thinking.

The next morning I took the lid off and there was a small patch of wax being built on the screen. I couldn't see any direction yet also the bees didn't seem to mind the turning as they were bringing in nectar and pollen. The next morning the patch of comb was larger maybe 2½ inches but still no direction. Later that day I noticed both sides of the circle of wax now had point on each side. This was the start.

The next day these points extended farther and two new ones were being built on both sides. This comb finally reached both sides of the bucket with adjacent comb built along side. There was no curving of the comb in fact it looked perfect.

So all I could deduce was the turning of the hive made no difference in the way comb was built!

One other thing – when bees build comb there's not four directions but only two – north and south are the same as is east and west. So the most the comb could be off from the parent hive is 90° not 180°? (A. Wenner)

Also new swarms seem to build nice even true comb. They start with a center comb then work from both sides using this center one for a guide but if you put an empty super on top of these same bees the comb will be really bazaar. For the most part it's like they lose their guide. Anyway that's my thought on the subject of the magnetic field.

Jim Cowan
Aberdeen, WA

The "Superbee"

Sue Cobey of the University of CA, Davis, has managed to import bee germplasm into the country, and once again there is an attempt to produce a "superbee." While many are applauding, I cringe. This sort of manipulation of the honey bee, coupled with the use of controlled mating and the mass production of copycat queens is extremely damaging to the species. This is because, in addition to spreading pathogens, a risk that cannot be entirely ruled out, these transfers lead to genetic uniformity within the global bee population, and irreparably weaken it.

Indeed, genetic uniformity is extremely dangerous for any organism and for our ecosystem as well, especially when the organism in question is a pollinator as crucial as the honey bee! We know that it is vital for honey bee populations of any size, from the individual colony to the entire species, to possess a wide array of genes. This not only enhances hive performance and health, but also increases the overall strength of the species.

At the same time, local bee populations should retain their characteristics, which are expressed by how well adapted the bees are to their local conditions. Unfortunately, the introduction of foreign genetic material into local genetic pools destabilizes them.

Furthermore, when beekeepers depend on strains of honey bees that are produced through controlled breeding, they are forced to keep buying these stocks from commercial breeders, as these lines of bees cannot be maintained through open mating processes. As soon as this happens, gone are self-reliance for beekeepers and genetically rich bee populations.

There are those who justify the importation of bee germplasm by claiming that we do not have sufficient bee genetic diversity in this country. This could not be further from the truth! Research has clearly shown that the genetic diversity of the U.S. bee population is in fact greater than that found in some countries in Europe, for example.

Others claim that we need to breed bees that are pest and disease resistant. Again, what a fallacy! There is no more a biological silver bullet than there is a chemical one. Or if there really is one, it is the honey bee species as a whole, living in a healthy environment.

There is an entire bee species out there. And that is what we need to work with and for, instead of focusing our attention on irrationally publicized lines of bees. Beekeepers must look beyond the health and productivity of their own individual hives. They, along with scientists and researchers, are accountable for, and must give serious consideration to the wellbeing of the honey bee species as a whole. When they do not, they are simply abusers of the entire species.

For all the reasons I have outlined here, I fervently object to bee breeding efforts such as the one I mentioned at the beginning of this letter. As an alternative, I strongly encourage all beekeepers to produce queens and bees from their own colonies. Desirable genetic material can be found in our own local bees. It is up to all of us to allow it to emerge without interference on our part. This is what will keep our bees alive and well.

Serge Labesque
Glen Ellen, CA

Cobey Replies

To the beekeeping community in response to Serge Labesque's letter

I agree with Serge's view that the need to maintain genetic diversity of our honey bee gene pool is critical to maintaining a healthy beekeeping industry, of which our food supply is dependent. Honey bees, especially, are sensitive to inbreeding. A series of new research studies clearly demonstrates that intra-colony genetic diversity increases overall colony fitness, vigor, survival and resistance to pests and

disease. Genetic diversity provides the raw tools for selection.

I disagree with his logic in accomplishing this. Honey bees are not native to North America. Of the European stocks introduced before the 1922 ban on importation, only a small sample of a few subspecies were initially brought over and survived. Of the 26 subspecies identified worldwide, only two are currently recognizable in the U.S, Italians and Carniolans, or rather three with the establishment of the Africanized honey bee, AHB.

For this reason, I question Serge's claim that there is more genetic diversity in countries where these many subspecies are native and in which these populations include a variety of ecotypes of each of these many subspecies. Events in the U.S. have narrowed the limited gene pool available for selection.

The high loss of colonies, due to tracheal mites in the late 80s, *Varroa* in the 90s and continuing, and now CCD, may have compromised the integrity of our U.S. honey bee gene pool. These losses, coupled with the routine use of miticides and prophylactic medications, reduce selection pressure for traits of natural resistance in our domestic honey bee stocks.

A survey of queen producers in the U.S., conducted by Washington State University, shows a loss of 25% of the alleles in commercial breeding populations over a 10-year period from 1994-1995 to 2004-2005. This is significant.

Left on their own, as you suggest, honey bees tend to become more defensive and less manageable. With the introgression of the AHB and her tendency to dominate, this is the bee that will thrive, as we are already experiencing in the southern U.S. This is a major concern, especially for California, the breadbasket of our country, with its intensive agriculture and high demand for pollination services.

Beekeepers in northern climates should also be concerned about the AHB. Researchers Whitfield and Zayed show that invading AHB are interbreeding and selectively using certain genes from the European bees to give them an advantage to enhance their survival and fitness, while maintaining their highly defensive behavior and appearance. They suggest – this may include the ability to survive harsh Winters.

The goal is not to develop a "superbee," as this is unrealistic. Although, with the honey bee genome sequenced and the current work on identifying genetic markers to map specific traits, transgenic bees are likely in our near future. This is a topic that will raise discussion and be far more controversial than my proposal.

My goal is threefold.

1. **To enhance the genetic diversity of our domestic stocks.**

Honey bee semen from imported stocks will be crossed with proven commercial stocks to increase genetic diversity in our domestic breeding populations. This will increase colony fitness and increase the tools for selection.

2. **To benefit from selection programs abroad.**

Several European programs are showing progress in the selection of stocks with natural resistance to pests and disease, with a focus on *Varroa*. We hope to take advantage of these.

3. **To establish a protocol for the safe importation of stock.**

Currently this is inconsistent, based more on economics rather than biology. The importation of hundreds of thousands of Australian package bees to satisfy the demand for almond pollination in CA, occurs with no inspection for pests or disease upon arrival. Yet, we have very strict controls with quarantine requirements for the importation of a tube of semen, **as should be required for all importations.** We need a standard protocol for safe transport and in my opinion this should be limited to eggs and sperm, to minimize risk. Research to develop methods to "sterilize" these of pathogens, such as viruses is underway.

Yes, I also agree that beekeepers should be encouraged to rear their own queens, and develop regional breeding programs. We are seeing an increasing interest in this, yet the task is not easy, is very labor intensive and requires a long term commitment to be successful. Quality foundation stocks need to be available to establish these

programs. We also need a healthy industry providing large numbers of quality queen bees, of various stocks, to satisfy the commercial demands of agriculture.

Sue Cobey
Davis, CA

Bees In A Barn?

The premise was simple enough. Remove a colony of honey bees from the wall of a barn. I had done it, or something similar, two dozen times before. It's a piece of cake, or so I thought! My good friend and beekeeping buddy Lloyd Vosburgh decided to come along and give me a helping hand. After all, two heads are better than one, right?

It was a beautiful, warm spring day. The kind of a day perfect for removing a colony of bees. We arrived at the barn around 10 a.m., after a 30 minute ride from my house. With a quick inspection around the building's perimeter we spotted a stream of buzzing honey bees coming and going from the south facing wall. The interior walls were covered with homasote but with the use of a stethoscope we were able to pinpoint their exact location. With pry bars and hammers and utility knife in hand we quickly exposed a thriving colony.

I began cutting out each section of comb with a sharp knife. As I did so, I would give a cursory glance for the queen and then hand it off to Lloyd for a more thorough search. When satisfied with his exam, Lloyd would then trim and fit each piece of comb into a deep frame. The comb was held in the frame with three or four rubbers bands. Bands work well for this as it takes the bees two or three days to chew through them and they will have secured the combs to the frames with new wax by then.

The cavity was cleared of all the comb and most of the bees by around noon. We had successfully

banded enough brood comb and honey and pollen to fill a deep super with 10 frames. The vast majority of the adult bees were either in or going in the hive. There was just one tiny problem. A minute detail, really. Hardly worth mentioning but, we never did find the queen. We convinced ourselves that she MUST be in there after observing how the bees were fanning at the entrance and practically running into the hive. You see what I mean about two heads being better than one? We packed up the tools and took one last look at the bees as they crawled happily into their new home. As we drove away I said, "I'll come back tonight when it gets dark, close up the hive and take it home." Lloyd asked if I thought I would need his help. I declined his offer by saying something about how the hard part was done. Picking up the colony tonight would be a piece of cake. Famous last words!

Upon my return, later that evening, the smug look of success was quickly slapped from my face. As I waltz into the barn prepared for an easy pick up, I find about 90 percent of the bees back up on the wall! Dang! Shucks! I can't remember exactly what was said, but I think I have paraphrased it quite well. Apparently we did not get the queen into the hive after all. She must still be on the wall and most of the bees have left the hive to rejoin her. What do I do? WHAT DO I DO! My eyes dart around the dark interior of the barn, lit only by my trusty flashlight with 10-year-old batteries. What's this I see? A pail! I'll scoop as many of the bees as I can into the pail and dump them back into the hive. Yeah, that will work! As I brushed and scooped bees into the pail I prayed that the queen was among the thousands of buzzing, crawling and now stinging *Apis mellifera*. I closed up the hive and made a hasty retreat to my car where I brushed and shook bees from my clothing by the light of my high beams all the while nursing some well placed stings. As I headed back home empty handed, with my tail between my legs, I was thankful that no one else had been there to witness what happened. When it comes to bees, things don't always go as planned so I tried to convince myself that things would most definitely be better in the morning. Famous last thoughts!

The next morning, I drove back to THAT barn not knowing what to expect. I know what I wanted to see but, it was not to BEE! As I limped (bee stung ankles from the previous evening!) into the barn, I was surprised to see not only bees in the hive, but bees back on the wall and NOW, a pile of bees on a piece of the wall board we had left on the floor. "WHAT NOW," I exclaimed, or something similar. My memory is a bit fuzzy as to the words that were actually muttered. I walk over to the pile of bees on the floor, scratching my head, trying to figure out just what was going on. After a few seconds of examination I see why there are bees on the floor. Do my eyes deceive me? No. It's the queen, as big as life, strutting around as if she owns the place. Apparently, as I was scooping bees into the pail the night before, the queen fell on the floor. It's truly a wonder that I hadn't stepped on her. I pick her up and place her gently in front of the hive and she walks in. Once again, I leave the barn empty handed.

I return to the barn that evening for what I hope will be the last time. This time I am armed with tools of the trade, plus new batteries in my flashlight. I was a boy scout, years gone by. You know, "Be Prepared." Well anyway, I sheepishly walk into the barn to find all the bees nestled snuggly in their new home. What a relief. I screen the entrance, load the hive in my car, drive home and set the bees on their new hive stand.

As I walked into the house, worn to a frazzle, the phone was ringing. It was Lloyd. He wanted to know how things went with those "bees in the barn." What else could I say but that it was a piece of cake Lloyd. A piece of cake!

Jeff Burdick
Florida, MA

OBB/Dead Air Space

After receiving numerous requests for information concerning an easy and inexpensive way to perform a trial run on just several colonies, I submit the following. However, it is equally labor and material cost effective when applied to the conversion of a large number of colonies as a permanent solution for the *Varroa* mite problem. Refer to the article "A Commercial Grade Open Bottom Board," *Bee Culture*, May 2008 issue, page 45 if you do not have any extra supers available.

Material requirements: The only equipment you will need for each 10 frame hive is one empty super (shallow, medium or full depth), one (16" x 20") piece of ½" mesh, galvanized wire screen and a piece of scrap paneling or plywood to be used as a "Sticky Board."

1. Assemble Open Bottom Board (OBB) device: Completely cover the top opening of the empty super with one layer of ½" mesh galvanized wire screen. Tack or staple the wire screen to the top surface of the super walls. The only purpose the wire screen serves is to keep critters (Field/Deer mice and Squirrels) out of the brood chamber. The ½" opening is small enough to keep the critters out but big enough to easily let the bees, hive debris and mites through.

2. Place OBB on hive stand: Place OBB on hive stand with the screen on top. The hive stand can be whatever you currently use. There must be sufficient space between the hive and ground to allow adequate air circulation. **Note**: The next three steps can be done during either cold or warm weather without opening the hive or disturbing the bees. However, it does pay to smoke the bottom board area during warm weather and have a smoker handy during cold weather in case several bees come out to investigate. Also, it is best to have help lifting the brood chamber.

3. Remove from hive and discard: The standard wooden solid bottom board and (if used) the slatted rack.

4. Set hive on the OBB device: The open bottom of the brood chamber will be directly on top of the OBB screen with nothing in between.

5. Create the "Dead Air Space": Close all holes in the brood

chamber. The only permissible opening in the entire hive during all seasons is the large opening created by the OBB device.

6. Assembly & installation Complete – OBB/Dead Air Space system is operational.

Additional information notes:

1. Wind protection: There must be wind protection on both the East and West sides of the hive. Perhaps, in your area, you may also need protection on the North side. A baffle board leaning against the side of the hive will work fine. Wind barriers several feet away from the hive will not be sufficient.

2. Mite count: It is important, if only for your own peace of mind, to measure the live mite drop two or three days after installing the OBB device. Repeating the test on a weekly basis for about five weeks will give you a measurement of the effectiveness of the OBB/Dead Air Space system.

For information on counting mites refer to: *Bee Culture*, March 2007. Your "sticky panel" can be any piece of flat paneling that is white or painted white. The size should be large enough to receive debris and mite drop from as much of the open area of the OBB screen as possible.

3. The OBB/Dead Air Space system is not a cure-all: You will still lose bees over the Winter for other reasons. However, with the mite problem under control, you will find it much easier to recognize and identify the culprits. The two most common problems I recommend you consider are:

(1.) Nosema disease: Every Spring and Fall I treat my colonies with a preventive dose of Fumagilin-B.

(2.) Natural Pollen: Our Fall pollen supply is usually either insufficient or lacking in nutrition. After removing the surplus honey in September, I begin feeding the bees a pollen supplement product. I keep the bees supplied with the supplement until January or February and than remove it from the hive. I never feed it to them in the Spring, unless I want a fast and early buildup for either splitting colonies or making nucs.

John G. Hoffman
Mount Holly Springs, PA

ABF & AHPA

I write with the hope that the 2009 meetings in Reno and Fresno may be the last separate meetings of the industry. It was, perhaps, too optimistic to believe that the success of the Sacramento meetings would encourage reconciliation. The initial expectation for the joint meeting was, in one expression (and I wish I had thought of the it) – "Like two motorcycle gangs drinking at the same bar."

Of course, it wasn't at all like that. It will be necessary that everyone involved compromise to achieve a unification (which ended in Minneapolis very many years ago). Maybe both organizations need to be folded into a successor. A few suggestions – Apiculture Association of America (AAA) or Amalgamated Beekeepers of America (ABA).

Whatever structural change occurs, the need, I submit, to achieving unified efforts is so much more required. The industry has, for example, four senators (the Dakotas), where beekeepers are a significant voting block. It is important to avoid diluting of efforts for the kind of governmental assistance – for all the Industry's unmet needs. Ad Hoc solutions (like the Sacramento meetings) may not suffice. So, I appeal to the "powers that be." You know the definition of leadership – find out where the group is going, and take them there.

John W. Straub
Winnetka, IL

My First Year

My first year as a beekeeper I read a few books, and understand that in time everyone has bad luck. One man I read about in 15 years had bees split and bear trouble. He even lost some to bad weather. Well I had all this in my first year.

I knew I'd get stung eventually. I wondered when and how many times. Well, then that bear hit my bees. I saw my hive on the ground, so like a fool I ran right over to see how bad it was. Well my bees weren't happy to see me. With no beesuit on I got stung 14 times before I got out of there. So I put a straw hat on my head with a curtain over that, a friend came over to help, so he did the same thing. After we got ready we went back to save my bees. I got stung three more times and so did my friend. So for the next 14 years I should be O.K. right?

So after all of that I still want more beehives and so does my friend. So if you think having bees is a bed or roses, think again!

But I love it and my beesuit finally came in.

Michael Knight
Stewartstown, NH

(This letter was first printed in our November issue with the wrong name, so we are printing it again with our apologies to Mr. Knight.)

INNER COVER

Inside this issue is your Annual Beekeeping Calendar, courtesy of our generous industry supporters. If you find it useful please give those who funded it a big AttaBoy when you contact them for supplies this season. I know they will appreciate it. We couldn't do what we do without the support of these industry businesses.

Along with them give our photograph winners a big hand too. We had hundreds of excellent queen photos and finding the best was a pleasant task. We choose those that appealed to us because of quality, imagination, and sometimes being in the right place at the right time. Too, we were looking for gorgeous queens. We wanted big, fat, pretty queens with long back ends and excellent color. Most of these fit that description but some happened to be photogenic because of what they were doing when the camera clicked. Yes, we know that the criteria for a great queen rests with attributes other than how she looks . . . but having a trophy queen in a colony that's doing well always makes a beekeeper feel good. So here's a dozen of them.

•

Encouraging things are happening on the pesticide front. This has happened before so some among us maintain a healthy skepticism which keeps our feet on the ground. But beekeepers talking to both Bayer and the EPA can't be all bad. Hats off to those who instigated these conversations, did their homework, and took the time and spent their money to go and sit and listen and learn and persuade and cajole and make things, hopefully, just a bit better for all of us.

Elsewhere in this issue you can read the story of the Bayer meeting (or maybe you caught it on CATCH THE BUZZ more than a month ago) so you know that the next one will be held later this month at the AHPA meeting in California. The timing is good for setting up trials this season but still, it will take all season to find out if Bayer's chemicals are causing problems. This leads to a couple of the topics discussed at the EPA meeting held in December.

One danced around something called Conditional Registration. Basically, if I understand the concept, a Conditional Registration is given to a chemical before EPA has all the answers they need before they allow a chemical to be fully registered. That's because there is a perceived acute need for a chemical and the results of early tests kind of, maybe, seem to indicate that there isn't anything terribly wrong with the new stuff. EPA gives the registering company a timeline to get those answers but sometimes those companies are slow to respond, sometimes really slow.

Of course it takes time to do the research and generate the answers. But sometimes the companies find out, or even already know there is a problem and as soon as it is reported the chemical will be pulled and they can't sell it anymore. End of profits. End of story. I suspect that chemical companies don't want that to happen very often.

Recently, however, the NRDC (National Resource Defense Council), EPA and Bayer got into a dustup about alleged data withheld by Bayer that showed problems with a Bayer product that EPA wasn't aware of. Or so the NRDC believes. Bayer thinks not. It takes lawyers to settle these biological problems.

Interestingly, one of the NRDC lawyers involved is RFK Jr., who, even more interestingly was on the very short list to fill the EPA's Director job under the new administration. By now we probably know but in December I didn't, so it's only marvelous speculation.

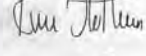
Another aspect of this that surfaced at *both* of these meetings was reporting problems with Conditional Registered products when used in the field. Incident Reports are real-world information used by chemical companies and EPA to measure the good and bad of a product, especially for conditional products. This can be inadequate control of the target insect, formulation problems or the like. But Reports are also used to track applicator errors that result in bee kills, citizen exposure or other 'incidents.' States are charged with enforcing label laws and must respond to and investigate Incident Reports. They in turn make the report and their response available to EPA so they have something to base a part of their Final Registration decision on. If the states don't, or won't investigate a complaint, there's no problem as far as EPA is concerned . . . and here's where the noise gets louder . . . are states actually making reports? According to EPA, essentially no. No reports . . . no problems. Are there no problems with chemical kills and honey bees? Apparently not, says EPA because states aren't making any Incident Reports. Is that correct?

If you don't report a pesticide problem there won't be a report . . . like all those state lottery billboards . . . if you don't play you can't win. But if you do report a problem and the state doesn't respond, doesn't come out to see, doesn't prosecute the applicator, doesn't fill out the paper work . . . then what?

And that's where this sits at the moment. How do you get states to be more responsive (in a non-funded mandate situation) to problems beekeepers are having?

Both Bayer and EPA seem interested in improving this situation, and already additional Incident Reporting facilities are becoming known, so things may get better. Watch for additional information here, in the BUZZ, and from your state and national associations.

For now, stay tuned. This will get more interesting as it moves along.



Calendars; and, Incident Reports

JANUARY – REGIONAL HONEY PRICE REPORT

We surveyed our reporters this month to find out what they sell most of their honey in…what kinds of containers. Recall that our reporters reflect a good cross section of the U. S. beekeeping industry, but tend to be a little heavy in the sideliner side, with about the right proportion as commercial beekeepers, the rest hobby beekeepers.

The chart shows region, container, amount of honey accounted for in that region for this issue, and the **per cent** of that crop that is sold in each kind of container. For the category Other, the predominant containers used were half pints and gallons.

Totals may not add up to 100% due to rounding errors.

Percent Of Crop Sold In Each Container

Region	Barrel	60#	½#	12 oz.	1#	2#	PT	QT	5#	Other	Total lbs.
1	55	7	5	3	13	16	0	0	17	0	46,000
2	0	30	8	10	15	13	15	1	7	5	26,000
3	19	23	0	8	26	8	8	2	4	0	5,200
4	0.5	16	7	10	11	9	10	25	4	7	69,000
5	0	0	0	14	11	19	14	0	7	36	17,000
6	13	8	0	6	7	10	13	21	13	10	173,000
7	2	11	5	5	10	9	14	16	13	4	21,000
8	0	9	1	10	14	8	19	30	8	0	26,000
9	0	9	1	3	5	22	11	24	3	22	33,000
10	0	0	5	65	15	5	0	0	10	0	31,000
11	34	6	3	9	7	5	9	14	3	10	21,000
12	2	5	11	7	12	21	4	22	8	14	98,000

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.53	1.59	1.53	1.60	1.39	1.48	1.48	1.53	1.53	1.50	1.44	1.45	1.39-1.60	1.50	1.48	1.17
55 Gal. Drum, Ambr	1.37	1.35	1.37	1.42	1.28	1.26	1.40	1.37	1.25	1.37	1.23	1.25	1.23-1.42	1.33	1.35	1.01
60# Light (retail)	120.00	124.50	130.00	122.50	120.00	115.00	110.60	105.00	123.98	123.98	134.25	138.50	105.00-138.50	122.36	121.76	114.33
60# Amber (retail)	120.00	113.50	130.00	120.67	120.00	115.00	106.00	89.50	113.50	130.08	129.25	143.75	89.50-143.75	119.27	113.31	111.29
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	52.08	60.98	45.60	44.42	60.33	42.80	42.11	60.33	60.33	42.00	44.40	82.00	42.00-82.00	53.12	51.93	48.94
1# 24/case	71.04	76.78	72.00	66.32	96.00	73.87	61.90	72.60	70.00	94.00	78.00	94.20	61.90-96.00	77.23	76.60	67.62
2# 12/case	69.72	64.08	66.60	57.30	66.00	58.70	60.33	81.00	57.50	69.24	58.80	77.80	57.30-81.00	65.59	67.37	60.28
12.oz. Plas. 24/cs	64.32	70.98	55.00	66.76	57.60	56.56	56.38	64.20	54.00	53.28	59.75	68.00	53.28-70.98	60.57	59.45	53.40
5# 6/case	89.10	75.98	78.00	66.10	77.00	96.00	76.48	77.40	66.00	74.82	68.95	88.25	66.00-96.00	77.84	80.90	67.46
Quarts 12/case	118.67	146.18	118.67	94.23	85.50	82.03	87.75	86.33	102.12	120.00	89.10	114.00	82.03-146.18	103.71	98.19	100.01
Pints 12/case	68.21	73.98	68.21	64.76	58.00	53.15	63.99	56.00	66.00	69.00	49.80	66.00	49.80-73.98	63.09	65.05	61.59
RETAIL SHELF PRICES																
1/2#	3.82	3.48	2.47	2.83	2.29	2.75	2.83	2.35	2.44	2.75	2.97	4.00	2.29-4.00	2.91	2.94	2.68
12 oz. Plastic	3.50	4.06	3.12	3.66	4.76	3.60	3.33	3.73	3.36	3.33	3.84	4.33	3.12-4.76	3.72	3.88	3.47
1# Glass/Plastic	4.13	4.69	4.80	4.66	5.08	4.67	3.91	4.60	3.93	4.60	4.67	6.19	3.91-6.19	4.66	4.65	4.34
2# Glass/Plastic	6.00	7.50	8.54	7.13	7.37	6.86	6.75	8.08	6.67	7.19	6.81	9.50	6.00-9.50	7.37	7.61	7.15
Pint	7.50	8.08	9.11	6.28	5.62	5.42	8.48	6.71	6.53	8.75	6.00	8.87	5.42-9.11	7.28	6.92	6.42
Quart	12.43	12.32	12.00	10.20	9.15	9.12	9.29	11.00	11.44	16.50	10.32	14.50	9.12-16.50	11.52	10.45	10.08
5# Glass/Plastic	17.50	15.24	15.08	15.98	20.00	15.25	15.91	17.33	18.00	15.82	14.91	22.00	14.91-22.00	16.92	17.44	16.11
1# Cream	5.55	5.61	6.00	5.44	5.55	3.85	5.23	4.33	5.55	6.78	4.61	6.91	3.85-6.91	5.45	5.57	5.31
1# Cut Comb	5.50	5.09	6.50	5.50	7.14	4.50	6.79	5.50	3.29	8.00	7.56	8.63	3.29-8.63	6.17	7.14	6.53
Ross Round	6.81	4.46	6.50	4.75	6.81	5.00	6.10	5.00	7.50	6.81	7.25	8.50	4.46-8.50	6.29	6.37	5.75
Wholesale Wax (Lt)	3.50	3.13	3.63	3.73	3.00	3.15	2.88	3.75	3.10	4.00	3.58	3.00	2.88-4.00	3.37	3.24	2.65
Wholesale Wax (Dk)	2.50	2.32	2.50	2.53	1.90	2.20	1.65	3.00	2.60	3.11	2.44	2.50	1.65-3.11	2.44	2.66	2.23
Pollination Fee/Col.	80.00	86.00	65.00	45.50	150.00	55.00	52.40	60.00	88.03	88.03	92.50	105.00	45.50-150.00	80.62	75.40	70.03

RESEARCH REVIEWED

The Latest In Honey Bee Research

Steve Sheppard

". . . thymol and resveratrol undoubtedly have potential in the development of alternative strategies for the control of nosema disease"

One of the more recent newsworthy problems facing honey bees and beekeepers is the microsporidian *Nosema ceranae*. This honey bee pathogen was only recently described in U.S. honey bees, although there are new data from archived honey bee samples showing that it has been present in U.S. populations for at least a couple of decades. Perhaps more interesting are findings showing that *Nosema ceranae* is now the predominant microsporidian infecting U.S. honey bee populations, rather than the previously well-known *Nosema apis*. *N. apis* was often regarded as most problematic in winter clusters, especially in areas with cold and long Winters. However, *N. ceranae* appears less tied to this cycle and high spore loads have been found in bees during late spring and summer. As beekeepers in the U.S. try to understand the ramifications of this new pathogen and decipher its possible contribution to colony collapse, reports have emerged from some European countries that *N. ceranae* may be responsible for significant colony losses. Given that antibiotic treatment of colonies with *Nosema* is not widely practiced in Europe, there is an interest to identify compounds of natural origin that have an inhibitory effect on *Nosema*, yet exhibit low toxicity to bees and low potential for residue problems. A recently published article by researchers from Italy provides new information on the potential of several compounds of natural origin to inhibit *Nosema* infection (Maistrello et al. 2008).

Initially, Maistrello and colleagues tested the toxicity of four experimental compounds to bees and the palatability of these compounds when used in bee candy. The four compounds were: thymol (from the essential oil of the thyme plant), Vetiver oil (distilled from the roots of *Vetiver zizanoides*, known to be repellent to some arthropods and toxic to termite symbiotic protozoa), lysozyme (an enzyme having bacteriolytic and anti-viral properties) and resveratrol (a plant compound known to have anti-cancer and anti-inflammatory effects). The researchers set up a total of 30 test cages with 20 bees each. Each cage was maintained in an incubator and bees were fed with treated or control candies and given free access to water. The consumption of candy was weighed several times throughout the experiment and the percentage of dead bees at the end of the experiment (day 11) was used to measure relative toxicity. The results showed no significant differences in candy consumption or mortality among the different groups, therefore all compounds were subsequently tested for their anti-infective properties against *Nosema*.

The infection experiment consisted of feeding 18,000 spores of *N. ceranae* to each of 30 bees in a cage and then maintaining them in an incubator with candy for up to 25 days post inoculation. The researchers made four replicates of each of the five treatments (four compounds + control) for a total of 20 cages. The median survival time of the cage population (the number of days at which the cumulative survival was 50%) was used as a comparative measure and bees were periodically sampled on days eight, 13, 19 and 25 for analysis of spore loads. The within-group variation was highly significant only for the lysozyme fed group and all bees in this group were dead by day 25, so it was not considered further in the statistical analyses. The greatest increase in the infection rate over 25 days occurred in the control bees, with a final mean spore level of 230 million spores/bee. Of the remaining test compound groups, bees fed thymol and resveratrol had a decrease in spore load by day 25, with the thymol group showing a decline in spore counts beginning on the day 19 sampling and resveratrol showing a decline only for the day 25 sampling. The final mean spore counts for the thymol and resveratrol treatments were 20.2 million spores/bee and 54 million spores/bee, respectively, which were both significantly lower than the spore load recorded for bees fed control candy (230 million spores/bee).

The researchers concluded that resveratrol and thymol had significant effects on reducing spore loads in infected bees. They suggest that thymol may have engendered its reduction in spore loads by inhibiting "the development of the parasite," as the spore load was lower at the end of the experiment than at intermediate sampling dates in this group and further, that spore counts in the thymol group were lower than in all other fed groups. They noted that the spore load on day 25 in the thymol group was more than 11 times lower than

in control bees. In the resveratrol-fed group, Maistrello and colleagues suggested that the reduction in spore load on day 25 might have been associated with increased longevity (although resveratrol has been shown to have anti-microsporidian properties in other cases). They noted that resveratrol has been reported to increase longevity in other small invertebrates. If true for honey bees, then keeping individuals alive though the infection may have allowed *N. ceranae* to run its course. The researchers concluded that increased lifespan of bees may have been "due to specific anti-oxidant properties of resveratrol", but such clarification would require further research.

In their final assessment, the researchers noted "...thymol and resveratrol undoubtedly have potential in the development of alternative strategies for the control of nosema disease." The authors contended that a significant benefit of using these substances is they would not damage "the image of honey as a natural product. They cautioned there was a need for further experimentation to determine specific dosages (and avoid either obvious or sublethal toxic effects of the compounds) and evaluate the option of syrup feeding. Nonetheless, this paper represents an important first step in evaluating several novel compounds for *Nosema ceranae* control. BC

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Maistrello, L, M. Lodesani, C. Costa, F. Leonardi, G. Marani, M. Caldo, F. Mutinelli and A. Granato. 2008. *Screening of natural compounds for the control of nosema disease in honeybees* (Apis mellifera). Apidologie, 39:436-445

Bayer & Beekeepers Meet

Randy Oliver

The neonicotinoids insecticides have been given widespread press coverage, and even been the subject of street protests in Europe, for their purported effects upon honey bees. With the advent of Colony Collapse Disorder, beekeepers have been questioning Bayer CropScience® whether the "neonics" could be causing sublethal effects on bees that could be harmful to colonies.

To better answer that question, researcher Dr. Jerry Bromenshenk (The Univ. of MT-Missoula) invited Dr. David Fischer (Chief Scientist, Ecotoxicology, Bayer CropScience®) to participate in a groundbreaking stakeholders meeting at the CA State Beekeepers Convention in South Lake Tahoe November 11. This meeting was convened to establish a forum for objective discussion between beekeepers, researchers, and Bayer CropScience about the safety of pesticide products to honey bees.

This initial four hour meeting was purposely kept small to form the framework for a "Working Group." In attendance were representatives from Bayer, the national and California beekeeping organizations, commercial beekeepers, bee scientists, the Almond Board, and a State agricultural official.

Beekeepers are realists

Beekeepers made the point that they were realists who understood that pesticides kill insects, and that pesticides would continue to be a part of agriculture. Beekeepers were not asking for a sugarcoated version of the data, but simply wanted to know the good, the bad, and the ugly about each chemical so they could make informed decisions in working with growers and pesticide applicators. The beekeepers made it clear to Bayer that they were not interested in being at odds with the company, but would rather work together to find solutions.

Beekeepers expressed their concern as to whether current testing requirements for insecticides addressed potential sublethal effects of the newer systemic insecticides, such as effects upon brood and the fertility of queens and drones. Bayer acknowledged that simply satisfying EPA requirements did not necessarily address beekeeper concerns. They indicated that the purpose of their attending this meeting was to open a more positive dialog with beekeepers to address the transparency and trust issues.

As an example, questions were raised about the new insecticide, Movento®, which may affect lipid synthesis of bee larvae, and for which the label states: "This product is potentially toxic to honey bee larvae through residues in pollen and nectar." Dr. Fischer explained that the label only allowed the "short version" of the issue, and then elaborated about the full research studies. The beekeepers generally found the full data to be less alarming.

The issue of "transparency"

One complaint by beekeepers was that some of the trials used to test for the effects of chemicals upon bees appeared to be inadequately designed. They proposed that the national beekeeper associations form a Honey Bee Advisory Board (HBAB) to work with Bayer by reviewing the experimental design of trials prior to their initiation, so that beekeepers would accept the results as valid. Bayer affirmed that communication begins with the design of a research project, its relevance and scope, and that this process could be improved by input from beekeepers, coordinated with other researchers.

In light of the fact that fully informed beekeepers were less fearful beekeepers, Bayer provided a FAQ's document, plus some 30 published papers on the neonics. Dr. Fischer expressed Bayer's desire to project a more positive public image by making a point of being more transparent about their research data. He explained that one of the reasons for the apparent lack of transparency was that the company needs to be concerned that their testing data might become available to competitors, especially in other countries, where it could be used by another company to register a product. Assuming that matters of intellectual property protection could be resolved by signed agreements, the idea of an HBAB was well received by the Bayer representatives. Having an Advisory Board to work with Bayer on the design of appropriate and realistic trials could be an important step toward increasing beekeeper trust and acceptance of test results as relevant and valid.

Bayer may rely upon independent researchers to test their products. Some beekeepers questioned the adequacy of the experimental design of one of these trials. Dr. Fischer has taken due note of our critiques, and will address them at the next meeting. The Company is not adverse to repeating trials if it appears to be necessary.

In general, the beekeepers found that it helped to understand the constraints that the pesticide company operated under, whereas Bayer was open to beekeeper input in the process of pesticide registration.

Bayer invited to present at the AHP conference

Dr. Fischer was invited to return to the upcoming American Honey Producers Association conference in Fresno to present information on three pesticides of considerable interest to beekeepers: imidacloprid, clothianidin, and Movento. The beekeepers also suggested that Bayer could use the national bee magazines to keep beekeepers fully informed about their products.

An issue brought up by Dr. Fischer was the lack of "incident Reports" of bee kills for individual pesticides. Gerry Miller (Calif. Dept. of Food and Agriculture) explained that the problem is that county agents are no longer taking on the responsibility for investigating and reporting pesticide kills. In some states, reported kills are not forwarded to the E.P.A. Therefore, when a pesticide company or the E.P.A. look into the E.P.A. database to see if a pesticide is causing problems, there are far fewer documented incidents reported than the actual number of kills taking place. As far as government regulation is concerned, unless a kill incident is placed into the database, there hasn't been a problem. The Group will look into ways to make pesticide kill reporting easier for beekeepers, and perhaps fund their own database.

Bee friendly labeling

The issue of bee-friendly labeling was discussed. Unfortunately, Bayer is constrained as to what they can legally place on the label. The beekeepers suggested that perhaps a "Bee Friendly" logo could be added to draw applicators' attention, or that an additional leaflet could be attached. One recommendation was to use a European model of "best management practices" that could be tied to the Bee Friendly logo, including certification of growers who abide by such practices.

Recommendations for further progress included inviting the Canadian Honey Council to participate, to eventually invite other pesticide companies to join the group, and to consider annual Crop Protection participation by pesticide manufacturers at national beekeeping conferences. One of the next steps will be to determine how to move toward forming a permanent Honey Bee Advisory Board (to work with pesticide manufacturers) in conjunction with the national beekeeping organizations.

The overall feeling of the participants was that it was an initial step in a positive direction for cooperation between beekeepers and the pesticide industry. This face-to-face meeting helped to overcome preconceived perceptions by both sides. The willingness to engage in an open and honest discussion of issues bodes well for future cooperation between the beekeeping and agrochemical industries. BC

Randy Oliver is a commercial beekeeper in California and a frequent contributor to these pages.

Participants of the Working Group

Bayer CropScience – Dave Fischer, Veldon Sorenson, Jack Boyne

Researchers – Jerry Bromenshenk & Colin Henderson (Univ of Montana), Eric Mussen (UC Davis)

Beekeepers – Zac Browning (President, ABF), Darren Cox (AHPA), Gene Brandi, Shannon Wooten (CSBA), Jeff Anderson, Steve Godlin, Randy Oliver

Almond Board – Bob Curtis

California Dept of Food & Ag – Gerry Miller

Genetic Diversity And Changes . . .

Sue Cobey

Programs to establish and supply sources of high quality and varied honey bee breeding stocks are needed to maintain a healthy beekeeping industry and satisfy the commercial demands of agriculture.

Honey bees are one of the cornerstones on which our food supply depends, impacting our well-being and survival. Of the honey bee species, *Apis mellifera*, there are 26 recognized subspecies worldwide. These also include various ecotypes of each subspecies, adapted to different geographical regions.

Genetic diversity, the raw material for selection, enhances a population's chance for survival as it deals with the impact of pests and diseases. Uniform populations are less adaptable to change and more vulnerable to disease outbreaks, often with devastating results. There are well-documented examples of this in some declining wildlife populations and in monoculture stands in agricultural production. Preservation of the earth's biodiversity, the rich variety of life, is essential and our responsibility as stewards of the earth.

Changes In the U.S. Honey Bee Population

Honey bees are not native to North America. Early settlers introduced a small sampling of several subspecies, of which only two are currently recognized as commercial strains in managed colonies in the U.S., the Italian and Carniolan. Thus, the U.S. beekeeping industry was founded upon a limited gene pool. With the passage of the Honey Bee Act of 1922 imposed to prevent the introduction of exotic bee diseases and parasites, further importations were severely restricted.

The high loss of colonies over the past 20+ years, both feral and managed due to the introduction and spread of parasitic mites and pathogens, has likely narrowed the genetic variation available in our breeding populations. Losses can be attributed to tracheal mites in the mid 1980s, *Varroa* in the 1990s and the current phenomena of Colony Collapse Disorder. New and variant strains of pests and diseases, including *Nosema ceranae* and numerous viruses, increase this concern.

The recent reported loss of colonies due to Colony Collapse Disorder is alarming. A survey by the Apiary Inspectors of America report 36% of managed colonies were lost between September 2007 and March 2008, and during this same period a year earlier, 31% were lost. The routine use of miticides and prophylactic medications in colonies, reduce the selection pressure for natural resistance to pests and diseases in our domestic honey bee stocks, further weakening them.

The queen and package bee industry, responsible for re-stocking our colonies, depends upon a limited number of mother queens for large-scale propagation. It can be argued that not enough attention has been given to the selection of traits that confer resistance to the increasing challenge of pests and diseases. Stock selection programs are difficult, given the social complexity of honey bees, their mating habits, and the real world requirements of queen production schedules overlaid with the pressures of repeated introduction of exotic pests and diseases. Funding support for bee breeding programs, which are expensive, labor intensive and require a long-term commitment, has been limited.

The stocks used for commercial breeding are limited, having undergone a genetic bottleneck. A survey of queen producers in the southern U.S. and California, conducted by Schiff & Sheppard (1995 and 1996) and Delaney et al., (unpublished data), show a significant loss of alleles (different forms of genes) in commercial breeding populations over a 10 year period from 1994-1995 to 2004-2005.

The Advantage of Intra-Colony Genetic Diversity

The mating habits of honey bees are designed to promote high intra-colony genetic diversity. Queen honey bees have the highest level of multiple mating among social insects. In flight, queens mate with an average of 12 to 20 and up to 60 drones. Mating occurs in drone congregating areas, consisting of 10,000 to 25,000 drones from different genetic source colonies. The number and diversity of drone sires that mate with the queen increases the probability of establishing a diverse workforce.

Each group of workers fathered by a drone forms a subfamily or patriline. The various subfamilies within a colony have different thresholds and respond to a wide range of task-specific stimuli. The result is a behaviorally diverse work force, able to efficiently exploit resources, minimize the impact of pests and diseases, and resist environmental fluctuations.

A diverse workforce is flexible and dynamic. Each worker has a genetic propensity to perform specific tasks. These tasks are regulated by colony cooperation and environmental influences. The interaction among workers influences behavior. As the needs of the colony change, in the availability of resources and changing environmental conditions, the colony adjusts the numbers of workers engaged in each task. This ability enhances productivity and survival.

A series of recent studies clearly demonstrate the value of intra-colony diversity. With the use of instrumental insemination, experimental colonies headed by queens inseminated to a single drone (SDI) and colonies

Carniolan bee. (photo by Kathy Garvey, UCD)

headed by queens inseminated to multiple drones (MDI), all with the same volume of semen, were established and compared.

How well the queen mates influences her attractiveness and the attention she is given. Richard et al (2007) showed that MDI queens, mated to 10 drones, are more attractive and have stronger retinue responses (bees feeding and grooming the queen) compared to SDI queens. This study shows that mating quality changes the queen's physiology, pheromone profiles and social interactions.

Mattila and Seeley (2007) established swarms headed by SDI queens and MDI queens, and observed their growth and success. The genetically diverse colonies, those with 15 subfamilies, were more successful. They established nesting sites faster, produced more comb, had higher foraging levels, stored more food and overwintered more successfully, compared to genetically uniform colonies headed by SDI queens. Collectively, a diverse workforce is more efficient in utilizing the variety of available resources.

Genetically diverse colonies are more resistant to pests and disease, having a lower incidence, severity and variance of symptoms. Tarpy (2003) showed these results in a study where he infected colonies with chalkbrood, *Ascosphaera apis*. Infection rates of colonies headed by queens mated to a pool of semen from 24 drones, were compared to genetically uniform colonies headed by SDI queens.

Different tolerance levels among different subfamilies of workers within a colony result in less incidence of disease and faster recovery, preventing severe infections. Consequently, colonies with a diverse workforce have a faster growth rate, are more productive and are better survivors.

In another study, Seeley & Tarpy (2007) inoculated colonies with the American foulbrood bacterium, *Paenibacillus larvae*. The results were similar. Genetically diverse colonies, headed by queens mated to a mix of semen from 10 drones, were significantly less affected by the disease compared to colonies headed by SDI queens.

The group level response of a colony and the flexibility in performance of various specialized tasks increases foraging efficiency. Duong and Schneider (2008) reported this also applies to honey bee communication. Differences in communication signals among various subfamilies within a colony are beneficial. Different subfamilies vary in their performance of vibration signals and waggle dances. These behaviors influence the performance of tasks and help to organize information flow to get a job accomplished in a given situation when immediate attention is needed.

A specific subfamily specializes in a specific task, yet the communication system of the colony is highly integrated and adaptive to enable fast response. The various subfamilies within a colony have different thresholds and respond to a wide range of task-specific stimuli. This enhances the ability of a colony to exploit various resources and adapt to environmental changes more efficiently.

Genetically diverse colonies are also better able to maintain stable thermoregulation. The ability of a colony to maintain constant hive temperatures is critical to brood rearing. Jones et. al., (2004) reported that colonies headed by MDI queens maintain more constant brood nest temperatures, compared to colonies headed by SDI queens. Different subfamilies of bees start fanning at different temperatures. This prevents fluctuations in heating and cooling. Collectively, the different temperature thresholds of workers prevent excessive colony level responses.

The Africanized Honey Bee Advantage

The introgression of the AHB into North America and her tendency to dominate and displace European honey bees (EHB) is an increasing concern. Arriving at an opportune time, with the loss of feral EHBs to *Varroa*, the AHB was established quickly in the southwestern U.S. Her spread continues, with the benefit of several advantages beyond resistance to pests and diseases.

Interestingly, research suggests the process of Africanization may not be limited to southern climates. We previously assumed the AHB would not survive cold, harsh Winters. Whitfield and Zayed (2008) suggest that changes in the AHB may enable this adaptation. They explored why the AHB is genetically dominant over established EHB populations in the areas invaded. They found that the invading AHB benefits from the genetic makeup of their European predecessors.

AHB are not just randomly acquiring genetic material by interbreeding, they are utilizing certain genes from the EHB to provide an advantage. When they interbreed, the offspring look and behave like the defensive AHB, yet acquire European genes to enhance their survival and fitness. The researchers suggest this may provide Africanized bees with an ability to overwinter in cold northern climates.

Lobo et al. (1989) showed that populations of AHB in Brazil and Uruguay derived some of their genes from EHB sources, the established populations in which they displaced. The distribution of EHB genes in AHB populations, influenced by environmental and genetic interactions in their specific ecological ranges, likely contribute to the impressive adaptability of the AHB. The AHB has successfully colonized diverse and widespread habitats ranging from dry tropical climates to temperate regions in South America.

During the process of Africanization AHB have several advantageous traits; their faster development times, faster colony growth rates and a high rate of swarming. They also produce more drones, which disproportionately mate with EHB queens. Even during mating, AHB sperm have an advantage. Schneider et al (2004) showed that queens mating with both EHB and AHB drones preferentially use the African semen resulting in a higher percentage of AHB progeny.

Virgin queens, fathered by African drones, emerge

earlier and destroy developing rival queens fathered by European drones. African virgin queens are also more successful fighters. Workers are more attentive to African queens, which may provide another advantage. AHB are also considered social parasites. Small AHB swarms invade EHB colonies displacing the resident queens.

The AHB has proven to be genetically dominant resulting in a rapid loss of European characteristics in the areas they invade. In the U.S., this challenge will likely require the maintenance of European breeding stocks and the selection of manageable hybrid strains of EHB and AHB crosses. The establishment of bee breeding programs for re-selection is becoming increasingly important.

The Question Of Stock Importation

Programs to establish and supply sources of high quality and varied honey bee breeding stocks are needed to maintain a healthy beekeeping industry and satisfy the commercial demands of agriculture. Honey bee pests and diseases have become resistant to our arsenal of chemical controls. Stock improvement and maintenance programs, designed to select for productivity and natural resistance, offer the best long term solution.

The worldwide beekeeping community is taking a serious interest in the preservation of indigenous honey bees and establishing breeding programs to lessen the impact of pests and disease. Access to these foundation stocks would enhance the US honey bee gene pool and may speed progress in the selection for natural resistance to pests and disease, with a focus on *Varroa*.

Importation requires establishing a safe and effective protocol to minimize the risks of introduction. At present, the protocol for honey bees is inconsistent. Since 2004, hundreds of thousands of package bees have been imported annually from Australia to satisfy the demand for almond pollination, yet with no inspection program upon arrival. Importation from other countries is highly restricted, **as it should be.**

The risk of introducing such pests as the Asian mite *Tropilaelaps clareae* or undesirable bees such as the Cape bee, *Apis mellifera capensis,* in which unfertilized laying workers become functional queens that take over colonies, remain threats. The transmission of new and more virulent strains of known diseases and pathogens is also a concern. We have and are rapidly developing the technologies to test for these, which should be part of a required, standard protocol for all importations.

This article will be followed with a report on the importation of semen from two subspecies common in the U.S., *Apis mellifera carnica* from Germany and *A. m. ligustica* from Italy. The goal is to enhance our domestic honey bees with proven breeding stocks from abroad. To reduce risks, and with the assistance of APHIS, the USDA Animal Plant Health Inspection Service, controlled importations are limited to honey bee semen. The semen is tested for viruses and the resulting colonies held in quarantine for evaluation. BC

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ODORS RULE!

Joe Traynor

Odors affect people, bees and even mites. Maybe we should be using that tool better.

Six miles! The distance a male emperor moth can detect pheromones from a female moth. Just one of many examples of the phenomenal odor detection abilities of insects – abilities that far exceed ours. Some estimate that insects are more capable of detecting odors than dogs and up to a million times more capable than humans.

Eons ago, humans had a far more developed sense of odors than we do today – our sense of smell was used along with our other senses to detect predators and to track food sources. A keen sense of smell is not necessary in today's world but still remains dormant in most of us (it is understandably more developed in deaf and blind individuals). Studies have shown that male humans still respond to odors given off by females and that both men and women are more attracted to odors from the opposite sex that would result in offspring with enhanced immune systems – odor detection on a subconscious level has allowed humans to improve the health and vitality of future generations. Deodorants that mask human sex pheromones have put a monkey wrench in this natural process – in many cases we are no longer able to select a mate that will improve the species. The higher incidence of birth defects and autism in recent years has paralleled the increased use of deodorants. An exception could well be found in the bee industry. Put young males and females in the extracting room of a honey house in the middle of Summer and the prodigious amounts of sweat that often emanate from both would override deodorants (at least by mid-afternoon) and lead to subsequent mating events that would produce healthier offspring. Honey-house romances may well be producing a stronger, more vital America!

One way to mess with a honey bee's smell is to cover everything in smoke

Pardon the digression. Beekeepers are well aware of the odor detecting (olfaction) ability of honey bees – their response to odors from stings (alarm pheromone), to queen pheromone (used in swarm lures and bee beards), to chemicals in hives (sealing off menthol packets). Adrian Wenner's work with odors has caused bee language proponents to concede that odors are indeed involved in colony recruitment to a flower source. Scent training bees to detect land mines (see Bromenshenk, Jerry) and to detect diseases in humans have increased public awareness of the olfactory powers of insects.

The recent decoding of the honey bee genome confirms the olfactory powers of honey bees by showing a remarkable 176 odor reception sites (vs. 62 for fruit flies). All of the smelly stuff that beekeepers put in their hives has to be disruptive to the smooth functioning of a honey bee colony and could account for increased reports of queen supercedure in recent years – foreign smells could override queen pheromone odors causing bees to kill an otherwise healthy queen. Surprisingly the honey bee genome shows only 10 taste receptor sites, indicating bees have a relatively poor sense of taste. A highly developed sense of taste prevents animals from consuming food that could cause sickness or death (rotten meat, poisonous plants). Bees may be more susceptible to toxins, including pesticides, in nectar and pollen because of their less developed taste reception ability.

Entomologists have long used odors to combat insects. Yellow jacket traps and roach motels are crude examples. After pheromones were discovered, the war against insects escalated. Today the term *mating disruption* is widely used in entomology circles and refers mainly to flooding areas with the female pheromones of a target insect pest thus confusing males to the point where they are unable to effectively mate. Almond growers are making extensive use of pheromones to control navel orange worm, a major almond pest. Two puffer-dispensers per acre are placed in orchards to intermittently release pheromones that disrupt mating of the mature orange worm moth. These dispensers are sold by Suterra (see www.suterra.com) a subsidiary of the Roll Corporation that also owns Paramount Farms (almonds) and Paramount Citrus (mandarin oranges). Suterra sells mating disruption products for other insect pests, and also sells insect pest lures.

Control of *Varroa* mite is the number one concern of most beekeepers today. Harmful mites are also plentiful in the agricultural world but harnessing odors for mite control has proved elusive. With their eight legs, and lack of flying ability, mites may use their foot pads more than odor to navigate their environment. Perhaps *Varroa* detect a suitable bee cell in which to reproduce not by odor, but by vibrations produced by bee larvae. Chemical control is used almost exclusively to control agricultural mites, with a myriad of chemicals registered for mite control on crops and livestock. Beekeepers have borrowed a few

Do the chemicals we put in a hive cover up the necessary smells in a colony?

of these chemicals to treat *Varroa* but soon run into the same problems encountered by growers: mites, because of their prodigious reproduction rates, eventually develop generations that are resistant to a given miticide. By having more chemicals in their arsenal, growers are better able to rotate chemicals and thus extend the efficacy of an individual chemical. Beekeepers, by not rotating chemicals and by increasing the dosage of individual chemicals have shortened the effectiveness of the few *Varroa* control chemicals at their disposal – fluvalinate (Apistan, Maverick) then Coumaphos (CheckMite), now amitraz (Taktic). Formic acid still works, but is not widely used because of potential health hazards and a smaller temperature window for maximum effectiveness. A new material, Hivastan® should be available in most states in 2009, but like previous chemicals, will eventually lose its effectiveness. Because Canadian beekeepers have used very little amitraz (due in good part to government regulations) an amitraz strip (Apivar) has been recently registered in Canada and looks promising in controlling *Varroa*. An amitraz strip would likely be of little value for most commercial U.S. beekeepers.

A method of controlling household mites, similar to that of a roach motel, uses a mat impregnated with a food attractant to lure and trap mites (see www.mitekiller.co.Kr/english/E_product4.asp or search *Eco-Technology mite killer*) The mites become physically entangled in the mat and cannot find their way out. The mat is placed in direct contact with a rug. In a beehive, space considerations would likely render this method ineffective. Sticky boards trap some *Varroa* mites in hives but not enough for effective control; a highly attractive *Varroa* lure on a sticky board might make the boards more effective, but again, space considerations would likely trump attractants.

An encouraging recent study shows that mites may indeed be susceptible to an odor-based control. Martijn Egas (Netherlands) found that a crop-destroying mite was very sensitive to the odor of a species of predatory mite. When the harmful mites were exposed to the odor of the predatory mite, they went into a hibernation state and ceased munching on crops. This is the only odor-based control of mites that I am aware of, but it may open the door to more sophisticated methods of controlling *Varroa* via odors.

Recently, much attention has been devoted to the honey bee genome, and rightfully so. Unlocking the secrets of the genome has already delivered benefits to the bee industry with the promise of more to come. It is possible that the bee industry could receive equally beneficial results by decoding the *Varroa* mite genome in order to find and exploit weak links in its genetic makeup. Surely there is a vulnerable spot in the make up of this pernicious pest that would lend itself to a successful attack. Most of the research against *Varroa* is done on the honey bee side of equation – mainly resistant stock, improved nutrition, small cell beekeeping, chemicals that kill *Varroa* but not bees – rather than on the mite side. There are lots of superior, dedicated bee researchers on the front lines of the *Varroa* battle but I know of no mite specialists engaged in the battle. Funding a fulltime mite specialist to work solely on *Varroa* – to find and exploit the chinks in *Varroa's* armor – may produce more useful results than those produced by honey bee people. BC

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a closer look

CHALKBROOD

Clarence Collison

Larvae must be under stress for this disease to become virulent.

Chalkbrood is a lethal fungal disease, caused by the pathogen *Ascosphaera apis,* which affects the brood of honey bees. Larvae ingest the fungal spores during feeding, and they germinate in the larval gut. The disease develops in the larvae after the cells have been sealed (Flores et al. 2005). Initially, the dead larvae are covered with a white fluffy growth of mycelia (the vegetative bodies of molds and other fungi, composed of hyphae) and are swollen to the size of the cell; later they dry into a hard, shrunken mummy resembling a small piece of chalk. If fruiting bodies form on the cadavers, they become dark in color (fruiting bodies are the spore-producing vesicles formed when mycelia of opposite sex (+ and – strains) come together; spores are the means by which chalkbrood is propagated). Honey bee larvae are most susceptible if they ingest spores when they are three to four days old and are under some pre-existing stress; adult bees are immune to the disease but are responsible for vectoring chalkbrood within the colony. Diagnosis of the disease in a bee colony is generally made on the basis of white, black, or gray larval mummies at the hive entrance, on the flight board, on the bottom board, and/or in unsealed and sealed brood cells (Gilliam and Lorenz 1993).

The presence of spores in the colony cannot, by itself, induce a chalkbrood outbreak. Larvae must be under either environmental or nutritional stress in order for *A. apis* to reach a state of virulence. A drop in temperature or an increase in humidity have been suggested as two predisposing conditions to the disease, and several studies have considered temperature extremes (both cold and hot) to be the primary stress factor (Mehr et al. 1976, Gilliam et al. 1978). Larvae in the fifth instar, prior to and some hours after sealing, are particularly vulnerable to these stresses that may trigger the disease (Puerta et al. 1994, Flores et al. 1996). A high spore count also appears to qualify as a stress factor (Koenig et al. 1987), for as the concentration of spores rises in the colony, the probability of a chalkbrood outbreak also increases. Spores infest food stores, both pollen and honey, and are introduced to larvae when nurse bees begin to feed some honey and pollen, about day three of larval development. Hale and Menapace (1980) found that *A. apis* can remain viable at least 12 months in bee bread (stored pollen); therefore, larvae receive a continuous exposure to fungal spores for many generations.

An investigation was made to determine if chalkbrood develops in all brood stages (Gilliam et al. 1978). Honey bee eggs; small, medium and large larvae; prepupae; pupae with no eye color and pupae with eye color were inoculated with *A. apis* spores. Larvae were inoculated with spore suspensions in distilled water by placing a drop of the mixture on either the mouthparts or on the dorsal side of the larvae and observed for signs of growth and/or mummification. Infection occurred both through ingestion of *A. apis* and by the growth of fungus through the cuticle. Mummies were produced from larvae and prepupae in five to seven days, but eggs and pupae were not susceptible to laboratory infection with *A. apis*. The fungus did grow on larvae killed by freezing with dry ice, but these larvae did not mummify. Of the susceptible stages, medium and large larvae and prepupae, large larvae (4.5 to 5.5 days old) were the most prone to infection. The reproductive state of *A. apis* was also investigated for any relevance to virulence. Twice as many of the larvae inoculated with mated *A. apis* showed fungal growth compared to those larvae inoculated with unmated *A. apis*. Mummies were produced from both mated and unmated strains.

"Colonies that show resistance to chalkbrood infection seem to express two common traits: hygienic behavior and the presence of various beneficial microbial organisms."

Tests were performed on 3rd and 5th instar larvae to determine the susceptibility of these instars to disease when environmental pressures were present versus when they were not. Third instar larvae were fed with high doses of spores (5×10^5 spores/larva) and given either a control treatment (i.e. no stress) or a cooling treatment (22 ± 2°C, (71.6°F.) for 24 hrs.) either prior to or after brood-capping (Puerta et al. 1994). Larvae in the control group did not show signs of disease, and no spores were present

in the digestive tract before pupation. Of the chilled larvae, mummification occurred in the majority of both the pre-capping and post-capping groups (59.6% and 65.5%, respectively). Chilling of older brood (spinning larvae or pupae) produced a much lower incidence of chalkbrood. When fifth instar larvae were chilled at 18°C(64.4°F), 24 hours before sealing and kept at 25°C (77°F) for six days after capping, mummification reached almost 95 percent (Flores et al. 1996). When the larvae were chilled, but the temperature after capping was held at 30°C (86°F) or 35°C (95°F), mummification reached 43.6% and 29%, respectively. When a cooling treatment was not applied, percentages of mummification after capping were lower: 77.6% at 25°C; 15.3% at 30°C; 2.22% at 35°C. A combined environmental stress test was also performed on 5th instar larvae. High relative humidity (87%) combined with a slightly cool 30°C temperature induced a higher percentage of mummification than a lower relative humidity (68%) combined with the same temperature: 7.75% versus 0.95%, respectively.

The persistent nature of *A. apis* within honey bee colonies was studied using a spray-inoculation technique applied over a period of four months. Beginning in August, suspensions of *A. apis* spores were prepared from sporulated chalkbrood mummies, then sprayed three times a day, triweekly, on the brood combs and bees surrounding the brood. This was done to examine the influence of a constant source of inoculum on the incidence of chalkbrood and the survival of the pathogen within the colony. For nine months afterwards, mummies were collected from dead bee traps and bottom boards and were counted in comb cells; and for seven months after, bees, brood and hive products were tested for *A. apis* via microbiological plating procedures (Gilliam 1986). Two major peaks of infection were observed. The first mummies were found one week after spray inoculations began; this seemed to be related to inoculum load and stress associated with the manipulations in setting up the test. Another major peak occurred around November 1 and appeared to be related to nutritional stress, since most colonies had little stored honey and pollen collection was dwindling.

"During periods of rapid colony development, especially in the Spring, it appears that having strong colonies with large nurse bee populations and good colony nutrition are important in reducing infections from chalkbrood."

Susceptibility of the inoculated colonies varied from nil to high, proving some colonies have resistance, and the pathogen was shown to survive in bee colonies without causing overt disease. Five months were required after the last spray before most substrates in the colony were free of *A. apis*, although a low level of contamination persisted in bee bread, honey and the guts of larvae from capped cells. Of the 4405 mummies collected, 2871 were black due to sporulation and 1534 were white, containing only mycelia. Three pupae mummified by *A. apis* were collected in the test (Gilliam 1986) and confirm an earlier assertion that mummified pupae are occasionally found (Gilliam et al. 1983). Even though pupae do not normally support the growth of *A. apis* in the laboratory, the mummified pupae apparently became infected as prepupae and somehow were able to develop into pupae before death occurred. These mummies were smaller than normal pupae but maintained body integrity.

Colonies that show resistance to chalkbrood infection seem to express two common traits: hygienic behavior and the presence of various beneficial microbial organisms. Honey bee colonies selected and bred for resistance and susceptibility to chalkbrood disease were inoculated with *A. apis* in pollen patties (Gilliam et al.1988). Good hygienic behavior, defined by the uncapping and removal of freeze-killed sealed brood by worker bees, was correlated with disease resistance in most of the test colonies. Resistant colonies had fewer contaminated hive substrates than susceptible colonies; e.g. most bee bread samples from susceptible colonies contained the pathogen, but few from resistant colonies did. Bee bread and the guts of nurse bees were the major sources of *A. apis* in susceptible colonies, but bee bread of resistant colonies also contained a greater number of yeasts and molds other than *A. apis*. Numerous microbes associated with honey bees, such as certain *Penicillum*, *Aspergiliius* and *Bacillus* organisms, produce chemicals that inhibit the growth of *A. apis* fungal spores (Wood 1998). Microbial assays on bees, brood, bee bread and honey showed that the most inhibitory microbes against *A. apis* spores were a *Rhizopus* sp. and an unidentified *Mucorales*, both found in bee bread. These organisms may have been introduced into the hive by foraging bees (Gilliam et al. 1988).

Since some colonies have *A. apis* present without visible signs of chalkbrood disease, having an early detection technique for the fungal pathogen would be beneficial. Unmated+, unmated-, and mated strains of *Ascosphaera apis* were examined for production of 19 enzymes (Gilliam and Lorenz 1993). All strains produced alkaline phosphatase, butyrate esterase, leucine aminopeptidase, acid phosphatase, and ß-glucosidase. Since valine aminopeptidase was produced by unmated but not by mated strains, it may be a useful enzyme for identification of mycelial strains of the fungus. ß-Galactosidase and á-mannosidase may be candidate marker enzymes for identification of both unmated and mated strains. Few other molds associated with honey bees produce these three enzymes. Use of enzymes as taxonomic aids could simplify tests of bees and hive products for *A. apis*, particularly unmated strains.

In order to improve colony management measures for the control of chalkbrood disease, it would be useful to have a better understanding of the conditions required for the development of this disease. Currently, development of the infection seems to be mainly dependent upon the physiological and environmental conditions of the larvae. Therefore, during periods of rapid colony development, especially in the Spring, it appears that having strong colonies with large nurse bee populations and good colony nutrition are im-

portant considerations. Selecting bees with high levels of hygienic behavior is also an important factor in chalkbrood resistance or tolerance. BC

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Pesticides, Bees And Wax

An unhealthy, untidy mix

Jennifer Berry

This past Spring our lab, along with Clemson University, received a critical issues grant from the USDA to study the sub-lethal effects of miticides on honey bee colony health and performance, (bee population, brood production, honey production, and colony foraging rates), brood survivorship and adult longevity, and finally worker learning and responsiveness to queen pheromone. It is a two year study with our first season's data collection almost completed.

The study consists of six treatments with eight colonies per treatment for a total of 48 colonies. The treatments are Apistan™, CheckMite+™, Mavrik®, Taktic®, copper napthenate and a control (no chemicals). Treatments were inserted in the spring and fall. The chemicals used for the miticides are as follows: fluvalinate (Apistan™ and Mavrik®), coumaphos (CheckMite+™), and amitraz (Taktic®). All three chemicals control mites; however Mavrik® and Taktic® are not labeled for use in honey bee colonies but are used by beekeepers.

There were two main issues we had to address before the study could begin. First, we needed a source of "clean" (miticide free) wax foundation. We are examining the sub-lethal effects of different chemicals; therefore we needed to start with a clean slate, everything equal. If there are differing concentrations of chemicals unaccounted for, then what are we really measuring?

The first step was to analyze commercial foundation in order to find a source free of miticides. I quickly discovered this task had already been completed and the results were not good. Commercial foundation from the top five bee supply companies in the U.S. had been analyzed and residues of coumaphos, fluvalinate and the metabolites of amitraz were detected.

The next step in the venture was to ask several "chemical free" beekeeper friends for wax. Both were and had always been chemical free (including their wooden ware). Their samples were analyzed and again the news wasn't good. Both samples came back with detectable levels of coumaphos (512 & 870 PPB), a breakdown compound of coumaphos, coumaphos oxon (32 & 31 PPB) and fluvalinate (1820 & 2500 PPB). These compounds were detected at levels measured in parts per billion, which are miniscule amounts, but unfortunately still present. So, where did the chemicals come from? Here are a few ideas. Maybe bees from nearby apiaries, which have been treated with miticides, deposit chemicals onto the flowers they visit. When the "chemical" free bee visits these flowers she comes into contact with the chemical(s), bringing it back to the colony. Another idea, the miticides came in with the foundation that was purchased and placed into the hives. Both beekeepers used commercially bought foundation.

We kept searching and finally headed south, all the way to Brazil. Beekeepers in Brazil don't treat with miticides because of the Africanized bee population. They emerge in 19 days which is too early for the foundress mite's progeny to complete development before the adult bee emerges. Anyway, wax was collected and sent to our lab. It was analyzed and, unfortunately, there were so many other chemicals detected it wasn't suitable for our study.

Finally we gave up trying to find a source of untainted wax and settled on using a ½ inch strip of un-waxed, plastic foundation. Four wires were added to each frame to increase the strength and durability of the wax comb. The bees did a great job building the wax combs, however it was during a nectar flow. The only problem; if the colony was slightly tilted from left to right they would

Frame with strip of unwaxed plastic foundation and four wires.

A comb drawn out from the plastic strip.

build from say, the top bar of frame three to the bottom bar of frame four. Then it was quite difficult to remove and examine frames.

The second issue that needed to be addressed was *Varroa* mites. Miticides were being applied to four out of the six treatment groups so we assumed the mite population levels would be contained. But what about the control or the copper napthenate colonies in which no miticides were to be applied? Varroa could definitely take their toll on these colonies and affect the results. We needed a non-chemical treatment, so we turned to powder sugar.

Each time we applied powder sugar we inserted sticky screens to measure mite populations. The colonies which received miticides were given one treatment in the Spring and one in the Fall according to the label instructions. By November the coumaphos, fluvalinate and copper napthenate colonies had an overwhelming number of mites, well beyond the economic threshold level determined for the southeast. Interesting?

Let me give a quick background for each chemical we choose to examine. Fluvalinate, a synthetic pyrethroid, is the effective ingredient used in Apistan™ strips. It targets the axons or nerve fibers used for the transmission of nerve impulses. At one time it was the only chemical registered in the US for the control of *Varroa* in honey bee colonies. Since its introduction, the formulation has changed. The original or "racemic" form of fluvalinate has now been changed to tau-fluvalinate. The difference: it went from having multiple forms (racemic) to a single form (tau). By doing so, the toxicity levels have increased two-fold. The original median lethal dose (LD_{50} - the lethal dose it takes to kill 50% of a population) was 65.86 µg/bee but with the new formulation the LD_{50} is now 8.78 µg/bee. This new level is considered to be moderately toxic to honey bees. But the EPA reported back in the mid 1990s that the LD_{50} for fluvalinate is now 0.2µg/bee which makes it highly toxic to honey bees. Most of this information was reported by Maryann Frazier in the 2008 June issue of *American Bee Journal.*

Mavrik®, also a tau-fluvalinate product, is a broad spectrum insecticide/miticide used to control a whole array of insects including mosquitoes, ants, spiders, mites, ticks, springtails, cockroaches, fire ants, and aphids to name a few. It is used widely in residential and commercial settings plus nurseries and greenhouses. Since the active ingredient is fluvalinate, same as Apistan™, beekeepers use this product primarily because it is cheaper.

Coumaphos, an organic phosphate, is an insecticide used for the control of a wide variety of insects found on livestock. It is a cholinesterase inhibitor, which attacks the nervous system. It is used against insects that live outside the host animals, (ectoparasites) such as ticks, and mites. It was registered in this country for use in honey bee colonies under a Section 18 or emergency use registration because of the mounting resistance to fluvalinate being reported by beekeepers back in the 1990s.

Amitraz, a formamide acaracide-insecticide, is used to control red spider mites (deciduous fruit crops, citrus, cotton and certain other crops), and leaf miners, scale insects, whiteflies, and aphids in other agricultural settings. On cotton it is used to control bollworms, white fly, and leaf worms. On cattle, sheep, goats and pigs it is used as a topical spray or dip to control ticks, mites, lice and keds (wingless fly). Since it is an acaracide (pesticide that targets mites) and again cheaper, some beekeepers chose to use it to for controlling *Varroa* in their colonies. However, it is not registered for use in honey bee colonies and is therefore illegal.

Fluvalinate, coumaphos and amitraz are all contact poisons. It is transferred throughout the colony by bee to bee contact. The mite either comes into contact directly or from the bee. They are also lipophilic molecules which are more likely to be absorbed and detected in wax than in honey. Amitraz degrades rapidly because of exposure to sunlight (UV), low pH, metabolism by bacteria and solution properties. Degradation usually occurs within two to three weeks, and is not very stable in honey, which is good news. The bad news is the break down products or metabolites which form are 2, 4-dimethylaniline (2, 4-DMA) and 2, 4- dimethyl phenyl formamide (2, 4-DMPF). These products are apparently more environmentally stable, plus the 2, 4-DMA has mutagenic (causes changes to DNA), oncogenic (malignant transformation – tumors) and genotoxic properties (genetic mutations) (Osano *et al.*, 2002). Of course this is dependent on the levels present.

Because of mounting complaints from beekeepers about problems with queens (increasing supersedure rates, and colonies unable to re-queen themselves) researchers began investigating the sub-lethal effects of coumaphos and fluvalinate on queens and drones.

In 1999, Rinderer's group investigated the effect of Apistan™ on drones. Their findings showed a 9.4% reduction of drone survival in colonies treated with Apistan™. Other negative effects were observed as well: lower weights, mucus gland and seminal vesicle weights and the number of spermatozoa (Rinderer *et al.* 1999).

In 2002 a group of researches from across the U.S. examined the effects of queens reared in wax exposed to varying concentrations of fluvalinate and coumaphos. Queens weighed significantly less when exposed to high doses of fluvalinate than those reared in lower concentrations or controls. Even though these concentrations were higher than doses beekeepers would apply, the misuse or accumulation of fluvalinate in wax could lead to these higher concentrations within colonies. They also examined other effects of coumaphos and found that during queen development, body and ovary weight were both lower. Also, when one coumaphos strip was placed into colonies with developing queens, they suffered high mortality along with physical abnormalities and atypical behavior. Both of these findings conclude that when

fluvalinate or coumaphos are applied during queen development there is a significant negative impact on the queen's health (Haarmann *et al.* 2002).

Two years later the effects of coumaphos on queen rearing was again examined. Known concentrations of coumaphos were applied to queen cups in which queen larvae were being reared. Queens exposed to 100 mg/kg of coumaphos (which, by the way, is the U.S. tolerance level allowed in beeswax) were rejected by colonies 50% of the time. If that exposure was increased 10 fold to 1000 mg/kg there was complete rejection (Pettis *et al.* 2004). There are two trains of thought here as to how the coumaphos may affect the queens. One the miticides are being passed around the colony from bee to bee and from bee to the nurse bees which are attending the developing larvae. The toxin is making direct contact with the developing queen. The bees detect this and therefore reject the cell or emerging virgin. The second thought is that coumaphos is being directly incorporated into the wax as the queen cell is being constructed, which the bees detect and reject (Haarmann *et al.* 2002).

Dr. Collins took the above study one step further. Beeswax cups in which queens were to be reared were exposed to known concentrations of coumaphos (0 to 1000 mg/kg). Young bee larvae were then transferred into those cups and allowed to mature. The cells were placed into mating nucs for 21 days and then into production colonies for six months, or they were dissected to determine mating success. Queens reared in coumaphos laden wax weighed less. All but one of the queens failed to develop after being exposed to 1000mg/kg. Greater than 50% of the queen cells were rejected in the group exposed to 100mg/kg. The number of queens still functioning in colonies after six months was reduced by 75% if they were reared in cells with the presence of coumaphos (Collins *et al.* 2004).

Queens aren't the only ones affected, drones are as well. A student from Virginia Tech recently investigated sperm viability of drones when exposed to miticides. Drones exposed to coumaphos (recommended dose on the label) during development and sexual maturation had significantly reduced sperm viability which continued to decrease over a six week sampling period (Burley *et al.* 2008).

At a point in our beekeeping history, fluvalinate and coumaphos may have served a purpose. You may remember the initial years of *Varroa* and how our colonies would not have survived without the use of these chemicals. However, over time, researchers, beekeepers and the bees themselves have found methods to reduce mite populations without the use of these harsh chemicals. Now with mounting evidence showing the negative impact these miticides are having on our bees, what more do we need to convince us? Sick, little, skinny queens mating with inept drones, which will soon be superseded by bees born in unhealthy, chemically laced wax; not something I want in my colonies.

We'll have more from this study when it has been completed and the results analyzed. Stay tuned. BC

Jennifer Berry is the Research Coordinator at the University of Georgia Bee Lab.

NEW HOME – Solving The New Beeyard Challenge

Finding A New Beeyard Takes Patience, And Doing Your Homework

Kim Flottum

At some point in your beekeeping life your bees, your family, your neighbors or common sense will tell you it's time to find a new or an additional place to keep some or all of your bees. Perhaps you got that message from someone this past season or can see it plainly in your future next year.

Maybe you have finally outgrown the backyard because you have reached the point of saturation and the amount of food your bees need exceeds the amount of food available in their foraging area. If, a couple of years ago half the number of colonies were consistently producing a healthy surplus and you hardly ever had to feed for wintering, a good guess is that you have overgrazed the area and it's time to spread out and find another location.

Sometimes family dynamics change. Remember when the backyard was your domain and 20 colonies out there were just fine? But now there are kids playing ball, your partner wants space to garden and you're going to make an addition to the garage. Perhaps it's time to reduce the population by half or more to stay safe, keep peace, and make room.

New neighbors can put a cramp in your beekeeping style. Too often it seems there weren't any neighbors at all until that new development went in. Or the folks who used to live next door were charter members in the Great-Gardener society and your bees were fine, but then they moved. The new folks...well, they're weird, and fussy. Either way someone new may change the balance you had and it's time to tone down or move out completely.

When looking for a location use GoogleEarth® for starters. It may turn up some surprises, like an existing beeyard only a few hundred yards away.

And sometimes we get too caught up in what we do. When you have mating nucs on the deck instead of lounge chairs and you can't use the side door because that's where you keep the dinks...well, think about that for a minute. Common sense should be getting the best of you right about now. It's time to spread out.

Moving to a new beeyard can be stressful because suddenly everything has changed. Starting with where can I go? And nothing is as convenient as it was. Of course all my stuff has moved and everything takes more time. I don't even own a truck so how can I get my stuff there, and back? And do you know how much it costs to drive way over there, twice, because I forgot...something? Too often it's too late tonight so I'll go over there tomorrow, or maybe next weekend, and sometimes never...

Once you've gotten past the excuses and the denial and decided that yes, I have to find a beeyard you'll quickly discover that finding and operating a distant yard is almost always more complicated than the one in your backyard. But there are some guidelines that can help make the transition easier, will make working there less time consuming, and in the long run will make your operation more ... well, professional. I've picked up these pointers over the years from experienced beekeepers, looking for my own outyards, and just this last summer at the EAS meeting in Kentucky listening to Jim Baerwald, a commercial beekeeper from Michigan who got me thinking about this in the first place.

Finding an outyard (I use the terms beeyard and outyard interchangeably here, but both mean a place you keep bees that's not at home) needs a three pronged approach that includes knowing what you need, finding it, and negotiating with the land owner for permission to use the spot. You need to consider the order in which you do these, too, because almost always you'll have to settle for slightly less than the ideal. Far too often we end up putting bees where we can rather than where we want or should because one or more of the guidelines can't be met. And that's mostly because we didn't do our homework.

First decide what it is you need in a beeyard that isn't your backyard. Here are some ideas.

Right off, you need easy and safe access to the site, plus a turnaround for your vehicle, be it family car, pickup or even larger truck. And you need that access whenever you need that access. You'll need it in early Spring when it's wet and that nearby creek is full, maybe in the Winter when the road in isn't plowed, and of course in the Summer when everything is easy. When looking at a potential site think of all the tasks you will be doing all season long. Is the site level so your hives are level and you aren't carrying full supers uphill or out of a ditch next

Fall? Can you drive your vehicle right up to the colonies so you aren't carrying all your stuff a mile or so? And can you get into the site whenever you want or is there going to be a locked gate issue sometimes? Better find out before you are locked out.

Right along with this find out if the site and the access are sitting on well drained soil. Is it swampy, all clay, all sand, a shallow water table...too often we look at only the site overlooking the way in and out, or vice versa. Check carefully and check over time if you can, and ask the landowner if there's a problem.

The site should be located quite a distance from residences if possible. It's just easier if you never have to worry about bees in the dog's water dish or the cattle feed trough. But you should consider a site that's close enough to a residence that if vandals show up they will be noticed. And that's a key. Your new site should be far enough off a road that it isn't visible from the road...and curious or destructive eyes. Now you know why some beekeepers don't paint their hives "here I am" white. Camouflage can be good.

Speaking of the dog's dish, where will your bees get water? A nearby creek or pond is ideal, but standing water in the Spring can be deceiving. Make sure some source is closer than the nearest neighbor or you will be moving again, shortly. Along with this is the thought that in dry years those plants located near water always do better than those not. If it's honey you are after, will there be honey plants during the dry part of the season? Better find out before you move.

Another thing to consider is what is the land used for? Has it been a meadow for a trillion years? Or is it in rotation along with your access road, and two years from now it will again be plowed and planted. Or will it get planted to another crop, one that's nasty for bees or makes access impossible. Make notes about this when you are driving around or looking online so you remember to ask the landowner later.

Sunlight is important. How much is more important. In the south, partial shade is not a bad idea for your comfort. But in the north all day sun isn't a bad idea. But remember wind breaks. In the Winter and early Spring colonies get a break if you give them one, and it's a trade off for Summer shade. It can be tricky finding a location that makes the grade for both of these elements.

One of the reasons you moved in the first place may have been that the number of colonies at home exceeded available forage. Don't trade places and not solve that problem. Scouting the area you might move to before you move there for all-season-long honey flows is mandatory – Spring, Summer and Fall crops are necessary at any location (unless, that is, you plan on temporarily moving again for other honey flows). If you have the luxury of time drive around a lot, looking for places that have just that...lots of year round blossoms. If you don't have that opportunity however, how do you start looking for a site in the first place?

There are several ways to approach this...simply driving around isn't a bad idea, again if you have the time over a season. But don't rule out the internet. GoogleEarth ® is great because it can give you ideas of where to drive around showing roads, fields, creeks, wooded areas, homes, farms, fences, abandoned areas, tilled fields, trails, other beeyards (maybe), ponds and lakes and bogs

Will the new spot get plowed and planted next year?

and swamps and anything and everything that can get in your way or can make a potential beeyard nearly perfect. Unfortunately those photos don't show every place in great detail. So on to plan B.

Get a county plat book. These show who owns the land you are looking at because of the driving around you've been doing. And get a good county map that shows creeks, golf courses, development roads already laid, ponds, streams, lakes and trails. And if appropriate get a good topographical map for your area.

Here's a tip. Don't go walking around before you talk to the land owner. You could get yourself in a world of trouble. So first, let's go meet the landowner, but not in your everyday bee suit, OK? Clean up a bit first.

When you know who owns the land you are interested in go for a visit. Don't be surprised if the owner lives somewhere other than on the land, and if they live in another state it may be difficult to negotiate this, at least in person. But for now, let's assume they live close. Maybe you can call first and make an appointment, explaining who you are and what you are interested in and that you would like to visit and talk. But probably you have to make a cold call. Try the first, but don't shy from the second. If you have to make a cold call and they aren't home have a prepared note and leave it in the door with contact information.

Be neat, clean and on time if you have an appointment. I am absolutely amazed at how many people can't tell time, or won't bother. And bring honey. You already know how much persuasion a simple one pound jar of honey can do...and it works just as well here. And no

Out in the open may work, but wind, sun, and cattle may be a problem.

No matter where you go, it probably won't be as easy as home, but if you do it right, it could be better.

matter what the outcome leave the honey. If things don't go quite the way you want a jar with a label sitting on the kitchen table may get them to thinking later. And they'll know how to get in touch with you.

Introductions should include who you are, that you are an experienced beekeeper and are looking to expand. Don't be afraid to tell where you work, relatives nearby they may know, where else you have bees if you have them somewhere besides home, and anybody you can think of as a reference. Mention your bee club (you belong, right?). Don't forget to mention the benefits of having bees on their land for increased crop pollination, wildlife food and just the 'naturalness of bees.' You may even want to put together a sheet with all this already written down that you can leave, along with contact info...in case they want to check you out.

Lay out exactly the type of location you need for your bees...noting all the things listed above. Tell them you've researched some part of their land using whatever means from a distance and it seems likely that it meets most of the requirements you need and the next step is this visit.

Tell them what to expect from you, exactly. Trips in and out at all hours maybe, that you don't and wouldn't even consider changing anything at all without consulting them first (tree or branch removal, fences, herbicide sprays, whatever), that you are responsible for the bees and any trouble they may cause and that you have the appropriate insurance (you do, right?), that you will address any problem they have with the bees or the beeyard immediately, that you normally pay for this privilege in honey, and about how much and when (10 – 15 pounds/year is about average, paid at harvest, but it is certainly a negotiable item), and that if there's a problem this is where you can be reached day or night, and in fact here's a friend that can help if I can't be reached and here's his number.

If you go through all this and they haven't said absolutely not, never, not on your life, my wife is deathly allergic or worse, then switch to the other side of the coin and tell them what you might expect from them.

Well, begin with, not much really, but there are some things that you need to know if this is going to work. Mention the gate thing, the plowed field next year thing, the let me know if you see anybody around the bees other than me thing, a swarm in the tree thing, and anything weird that happens with the creek, neighbor, road in, fence, bear, deer, dogs, or whatever, whenever that they know about and maybe you should know about things. It pays to listen here. It's their land and they know it far better than you do.

If you get past all this without objections it's time to actually walk the site. Walk from the main road in. Don't ever make an assumption about anything when it comes to getting in, out or being there. And here's a hint...make arrangements to come back at night. See what it looks like when you can't see it.

During the first visit look for every problem you can find. Holes in the road, downed trees, that fence and gate, creek, soft spot, and anything that looks like it may be a problem at any time of the year. If possible have the land owner walk it with you, pointing out what you will be doing...where the bees will go, the turnaround for your truck, maybe some super storage in a stack over there, is there a problem using a smoker in this dry area, can I remove those branches so they don't scratch the top of the truck there, what about railroad ties for hive supports, or pallets, or even cement slabs over here, weed whacking around the hives, or whatever you can think of that you routinely do when you are working bees. You don't want any surprises and you don't want to give the land owner any either.

Then ask about neighbors, who they are what they do and do you know them? And how much do they know about the land, really...what kinds of trees are in the forest across the field, what grows in the field, who bales the hay here, plants the beans or the corn or the cotton there, and who logs that woodlot across the road. Ask if they know of any development plans in the works, or new roads, golf courses or county parks being planned that might get in the way of a 20 colony beeyard in a year or three.

Ask if they know of other beekeepers within a mile or two, if there are livestock that can mix and mingle and tip and topple you colonies (and if there are, can you put up a fence to keep them from doing just that). Don't forget to ask if the land is for sale, if anybody in the family is allergic to bees, if they have a swimming pool or livestock feeding operation, if the thought of a swarm in their front yard would cause a panic in the family, or if they have a field on the other side of the woods that uses a lot of pesticides all Summer long.

And then ask them the hardest question of all...would they like a signed agreement for all of this, so there's no questions at all from anybody about anything at all...ever. You may think this is silly...but too often strange things happen with land and owners and deeds and whatnot. And a signed agreement is not dissimilar to a pollination contract. It spells out exactly what each party can expect and is expected to do. No surprises.

The initial conversation you have with the land owner will solve a lot of problems before they ever happen if you ask the right questions the right way. You need to find the right location for your bees, and that's certainly a priority, but you also need to protect your landowner from any problems from your bees.

If you are happy, your bees are happy, and the landowner is happy, you have the makings of a long and profitable relationship. But do your homework before you begin all of this. It will pay off in dollars, time, energy and ease in keeping your bees somewhere besides the backyard. BC

This Year, Start Your Move To

NATURAL BEEKEEPING

Ross Conrad

Why transition to organic beekeeping? If what you are doing works and you are satisfied with the results, then there may not be a need for you to change your approach. Feel free to skip the rest of this article and move on to the next. However, if your annual Winter losses have climbed to 20 percent or more, or you are concerned about pesticide resistant mites, or chemical and antibiotic contaminants in your honey and wax, then a hard look at some possible alternatives may be in the cards.

Why Be Concerned About Conventional Approaches?

To be fair, it is only recently with the arrival of *Varroa* mites that beekeeping seriously moved away from natural organic management of hives. Beekeeping was the last major agricultural industry to use chemicals on a regular basis to control insect pests. Unfortunately we failed to heed the lessons learned from the other agricultural industries, that insects will eventually develop resistance to the chemicals we use against them. Then higher concentrations or more toxic formulas end up having to be used in order to get satisfactory results. Relying on toxic compounds to control pests is a very short-term solution

The effect of contaminated honey on consumers and beekeepers becomes an issue when chemicals become an integral part of the beekeeper's management routine. Research is showing that the chemicals used to control mites in hives are being readily absorbed by beeswax.[1] These pesticides and their chemical breakdown products have the potential to migrate into the honey that is stored in the wax combs. By approving the use of these acaracides, the EPA has deemed the potential for such low-level contamination acceptable for the currently approved chemicals, fluvalinate and coumaphos, claiming that allowable residue levels in honey and wax are not exceeded when these materials are applied according to the label instructions. However, as health food advocates have been pointing out for years, just because you can make it to the door after consuming minute quantities of these toxic compounds does not mean that they are benign and are not harmful in the long run.

Exposing honey bees to sub-lethal doses of these toxic compounds also compromises the health of the hive, even if such detrimental effects are not readily and immediately evident. We may yet find that physiological and metabolic changes occur within honey bee populations over extended periods, and these detrimental effects may become obvious only after several decades of exposure. Research indicating reduced sperm counts in drones that have been exposed to coumaphos, and the negative effects on queens reared in cells constructed out of coumaphos-impregnated wax, validate these concerns.[2]

Repeatedly exposing bees and humans to small amounts of several toxic chemicals simultaneously is also unknown. The EPA requires safety studies be carried out only on individual pesticides in isolation, rather than in combination with one another. In actual practice, more than one chemical may be utilized by a beekeeper during the course of the season and these compounds are likely to combine with other agricultural pesticides and their break-down products that worker bees pick up during their foraging activities. Knowing that compounds may combine synergistically and have a greater effect when acting together than when used alone raises serious concerns about the effectiveness of the regulatory guidelines that are designed to safeguard our health and the health of our bees.

The meaning of Organic

Despite widespread belief to the contrary, the term *organic* does not mean that the final crop or product is free from toxic chemical contaminants. This mistaken perception has taken hold primarily due to the efforts of manufacturers and marketers, who have successfully promoted the notion that organic products are pure and chemical free.

Since its inception, the organic approach has traditionally referred to a management style and philosophy. Rather than being a statement about product purity, *organic* is all about the big picture. It refers to approaches that care for the life in the soil, the plants and animals, and minimizes the use of nonrenewable inputs and energy sources, such as those derived from petroleum. Organic principles as originally developed, embraced an attitude of fairness and care in regard to our common environment, as well as social concerns such as the welfare of farm workers. One of the original aims of organic agriculture is to establish a sense of stewardship for the earth, em-

One of Ross Conrad's apiaries in which no antibiotics or toxic chemicals are used to keep the bees healthy.

While traditionally looked upon negatively due to the typical decrease in the honey harvest that results, swarms such as this can be viewed as a natural way of supressing mite reproduction. The break in the brood cycle caused by the act of swarming and the raising of a new queen by the hive reduces the number of mites that can be raised within the colony during the course of the season.

bracing human-scale operations that fit harmoniously with the landscape and local community. Although it is certainly possible and usual for organic management practices to result in a cleaner product, it is not the primary focus. Instead, organic management seeks to mimic the natural world in its efforts to be sustainable, with the ability to be carried on indefinitely, as nature has proven herself to be.

In contrast, one of the guiding principles of the industrial model that has been so aptly developed by Western culture is the desire to maximize production and thus profits. When applied to agriculture, this typically results in the drive to push biological organisms to the limits of their capacity. Unfortunately, the focus on increasing our harvest seems to distract our attention from the quality of the crop that is being produced and the health of the plants or livestock that are doing the producing. In the dairy industry, for example, the cow that historically produced 15 to 20 pounds of milk a day and lived for 14 years or more in a healthy, relatively disease-free state has today been bred to pump out an average of 90 to 120 pounds of milk a day and has to be sent to the slaughterhouse within three or four years simply because she becomes exceptionally prone to sickness and disease from the stress of the forced increase in milk production. The poor cows are literally worn out. The humble honey bee is similarly affected by efforts to artificially boost the size of the honey crop. Activities such as the use of chemical mite controls, antibiotic use, or the feeding of sugar syrups and pollen substitutes, although often beneficial to honey production in the short term, can ultimately weaken the long-term vitality of the hive and increase its vulnerability to diseases and pests especially when administered on a regular basis. As a result, such management tools should be used sparingly, if at all.

Longer-Term Solutions for Healthy Hives

So what can we use to replace these conventional industrial approaches that does not have similar adverse impacts on our hives? A good place to start is to learn all we can about the life-cycles and habits of the honey bee along with pests and diseases associated with bees so that this knowledge can be used to bring about the desired results.

Bees that are unable to survive without our constant intervention don't have much of a future to look forward to. Therefore, when choosing to purchase bees, seeking out strains that have a proven genetic tolerance for mites and diseases will help to promote the development of genetic resilience within our apiaries. If these bees can be obtained locally within our geographic region all the better as such bees will have a proven track record of their ability to survive and prosper in our specific area with its unique climate and environmental conditions.

When it comes to *Varroa* mite control, our attitude of zero tolerance may need revising. It seems to me that rather than seeking to kill all the mites in our hives, the more we allow our bees to be exposed to *Varroa*, the faster they are going to develop a natural resistance to them. For some this may mean forsaking treatments all together and allowing the most vulnerable colonies to weed themselves out. For others, it might mean allowing a certain number of mites to continually inhabit their hives while simply keeping the level of mites down to a level that does not overwhelm the hive. This may be accomplished through the use of physical management practices such as installing screened bottom boards, *Varroa* mite trapping, or regularly making artificial swarms, (nucleus colonies) to break up the mite's reproductive cycle. Those of us who are not comfortable putting our hives to the test this way, can use some of the nontoxic mite controls that have become commercially available in recent years such as the essential oil based Apilife VAR, Apiguard® and Honey-B-Healthy, MiteAway II™ formic acid pads, or Sucrocide™.

Antibiotic contamination of agricultural products have been linked to the buildup of antibiotic resistant bacteria that sicken people. In the world of the honey bee, American foulbrood bacteria has built up a level of resistance to antibiotic treatments. As with toxic chemicals used against mites, there is reason to believe that regular exposure to sub-lethal doses of such drugs can adversely impact the health and wellbeing of the hive in the long-run. As beekeepers, we can help to prevent foulbrood infection by raising hygienic bees and the regular removal of old combs from the hive. For those hives that are showing symptoms of American foulbrood disease but still have a large population of bees, removing and destroying all the wax, honey, pollen and brood in the hive and shaking the bees onto new foundation, while scorching all the woodenware is a viable option of saving the bees and much of the equipment in states where such an approach is legal.

Small hive beetles can be trapped and killed using vegetable oil, rather than coumaphos, before they have the chance to lay eggs and hatch larvae that can decimate a hive. Equipment can be stored in such a way as to eliminate wax moth damage without the use of paradichlorobenzene (PDB) moth crystals.

In almost every instance where chemicals or drugs are being used, beekeepers have safe, effective and nontoxic alternatives available to them for controlling honey bee pests and diseases. Space constraints prevent me from carrying on about all the available options for too much

longer, however for those who are interested, most of the alternatives mentioned above and many more are covered in the book *Natural Beekeeping: Organic Approaches to Modern Apiculture* published by Chelsea Green. BC

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Three Bee-Related Vignettes

James E. Tew

Some thoughts on small hive beetles, honey sale customers and my home beeyard.

Three thoughts

Other than a broad, underlying bee theme, small hive beetles, honey customers and upcoming changes in my beeyard have little in common. I think of these three separate thoughts as being bantam articles. Small hive beetles come up at nearly any meeting I attend. Honey sale customers are not beekeepers, but they do ask bee-like questions, and as my grand kid population grows, I feel a need to do something with my backyard bees to make them more inaccessible to just anyone. Three thoughts – three short articles.

(1) The small hive beetle (SHB)

To me, this hive pest is in a category all its own. Those of you whose colonies have them plead for help. Those of you who do not have problems with them sit quietly while beetle discussions are ongoing. Those people like me, who are supposed to be making management suggestions, are at an impasse. No one seems to have good control suggestions. What should we do with this pest? I suppose I would catalog the SHB as an intermittent pest. Though it's never good to have these beetles, they are not universally horrible in the way *Varroa* mites have been hyper-horrible.

Those of you keeping bees in the Southeastern U.S. have had to deal with them for years. Some of you clearly had a problem and you begged for help. Those of you keeping bees in other parts of the country sat by quietly as the discussion went on. (Actually most of you in that group were feeling smug because you did not have the problem.) As did all of us in the university and regulatory business, I tried to read and listen to authorities who had information and experience. The SHB was routinely described as a "mega-wax moth." As though none of you had ever thought of it, beekeeping's first commandment, *"Keep your colonies strong"* was routinely bantered about beekeeping's literature. CheckMite+ and GardStar became the premier recommendation – a recommendation which continues to this day. Many of you (most?) don't feel that these products worked well and we all know that they are potentially dangerous chemicals for both you and your bees. In most meetings I attend, one of you dutifully raises your hand to ask if something better has come along to control the small hive beetle. No, it hasn't. If I am the speaker, I have no other option other than to follow the drill. (1) They are not universal pests and all colonies are not affected. (2) Coumaphos and GardStar are the common control materials. Apply the materials following label instructions. (3) Keep your colonies strong. My answers never satisfy you. They don't satisfy me either, but they are all anyone presently has to offer you. While standing in front of the group, I can feel the discontent.

States like South Carolina and Florida were the early reporters of SHB problems. Since they see bee problems all the time, people in the bee regulatory business frequently have the most practical recommendations. At the 2008 Fall meeting of the Alabama Beekeepers' Association, a regulator publically said what many of you have already seen. During the period when the SHB first attacks your colonies, the effects are at their peak. You're new at controlling this problem. Your bees are new at controlling this invader and the beetles are new at parasitizing a colony without killing it. You can see lot of newness is going on. But as time passes, (What? Two to three years?) the effects of the beetle seem to subside. Be assured that they are still there, but the effects seem to be naturally mitigated. I have no science to support this observation.

Some beekeepers report putting boric acid in CD jewel cases and placing these loaded cases on the bottom boards of infected colonies. Beetles, searching for small restricted openings, apparently enter through the small side openings in the jewel case and come into contact with the acid. Boric acid is a non-toxic abrasive that affects the beetles' ability to control its water balance. At first glance, this home-grown recommendation would appear practical. I do know that the novel suggestion is an alternative to traditional chemical applications. However, until proper testing is conducted, neither I nor *Bee Culture* magazine can categorically recommend it as an approved control procedure.

So, the small hive beetle continues to harass some of you and the range of the beetle is expanding. Those of you who were feeling smug, stop it. So, for the present, keep your colonies strong and, if necessary, apply approved chemicals while following label instructions. Sorry.

(2) A cameo view of the honey-buying public

Last November and December, we conducted our 19th annual holiday honey sale. Through the years, I have written about this event numerous times. It takes months to prepare for it. It takes heavy duty hand carts. It takes two trucks and it takes amazing amounts of physical labor, but we do make a little money. Over the ensuing years, we have established a cadre of loyal customers. But, most of our customers are brand new and frequently, these new people want in-

Customers shopping for honey.

formation along with their purchases. Be ready to be asked anything.

How are the bees doing?

The #1 question is, *"How are the bees doing?"* How should I answer that simple, direct question? The straight-forward answer is, *"Most are fine, but some are not."* But that answer seems flat and simplistic. Not wanting to make it appear that the honey comes from sickly, diseased bees, I normally go into a short rant about "evolving" bees and beekeeping. We have problems but we are learning to deal with them. Pollination services are threatened, but this fundamental service is not yet at the "dire" level. I thank them for their purchase and send them on their way – reassured, I hope. *(Then I move to the next customer and to the next question.)*

Does Blueberry honey taste like blueberries?

No and neither does Orange Blossom taste like oranges. The taste of nectar produced by the plants does not cross over to the fruit produced by the plants. Then a follow-up question frequently follows, *"Well which of these flavors do you think I would like best?"* I normally say something like, *"All honey is sweet and the flavor differences are strictly related to the flavor and aromatic qualities of the concentrated nectar – which is all honey is."* Then I must ask, *"Is this honey for sweetening beverages, cooking or simply eating on pancakes?* Sweetening is best accomplished by the blander flavors like clover while the slightly more pronounced flavors – like Basswood – are better suited for pancakes. Buckwheat is normally an acquired taste and is sometimes used to flavor baked beans. *(Generally, the customer, still looking somewhat puzzled, makes a selection and moves on.)*

How do you know this is Star Thistle honey?

So much as we can acquire, we offer varietal honeys. This year, we were able to offer Star Thistle, Clover, Basswood, Buckwheat, Orange Blossom, Blueberry, and Wildflower. So how does a beekeeper know his/her bees are producing the specific flavor of honey? Literally, this question has a sticky answer. *"Honestly, all of the honey in these flavor categories is not* ***purely*** *from that crop, but is* ***mostly*** *from that crop. Bees acquire surplus honey crops from plants having large populations – plants that are readily visible."* Common plants like clover produce copious surplus honey crops while plants with much smaller populations (say the flower garden plant Mountain Mint) never offers a surplus honey crop. True, the mint may actually be producing more nectar per plant, but there are simply fewer Mountain Mint plants for bees to work so beekeepers get clover honey but they don't get Mountain Mint honey. Beekeepers take off the surplus honey crop before the next major nectar-producing plant comes into bloom. *(Now please, move along).*

The last honey I bought from you went bad. I had to discard it. What was with that?

"Nope, it didn't go bad. It granulated. Honey granulation is a natural procedure that most honey types will do over a period of time. You should remove the jar cap and heat (hot, but not boiling) the jar in a water bath to drive the honey back into solution." Over time, it will probably granulate again. This is a good/bad honey characteristic. For the "pure food" consumer, it implies that the honey is probably natural and wholesome. That's good. But the water bath process is messy and time-consuming. That's bad. Sometimes, in my personal kitchen, it ***IS*** tempting to throw it away and get more honey but in a smaller quantity. In my lab, we have far too much granulated honey to just throw away, so we have ovens in which we can, time-consumingly, re-liquefy it. It's a common honey event. (Okay, I really am tired. No more questions. *(I'm sitting down now.)*

Honey sale volunteers

We have a few volunteers who annually help with the sale. Even though I tell them thanks time and again, I hope they read this – I love you. They bring fresh energy and exuberance to the process that I simply cannot maintain over a period of days and 100s of questions. Before, during, and after the sale, we could not survive without the volunteers who help us. Every year, I am a year older but every year, honey weighs exactly the same. We could not conduct this sale without this dedicated volunteer group. Thank you. Thank you.

(3) I put my garden shed where my mouth is.

Without having survey data at the ready, it appears that, increasingly, bees are coming to town. It could very well be that town bees simply generate more issues that rural bees. Either way, town bees elicit more troublesome societal situations than do rural bees.

Copious articles and presentations have been generated that offer suggestions on how we can be civilized neighbors to a bee-fearful public. Yet, when you look into the eye of a truly fearful neighbor, all of the lecturing and reading becomes almost inconsequential. But, believe it or not, there is a greater issue than neighbors and that is – grandkids. I presently have three whose ages are five, two, and six months. The

two-year old is a boy who is adept at being in the wrong place at the right time. If you want to encounter truly concerned people, deal with grandmothers (and mothers). For years, I have successfully dealt with concerned neighbors about the bees on my one-acre plot, but the grandkid thing has pushed me to the next level. I have occasionally written that we, as beekeepers, should become more proactive in making our bee colonies better neighbors. So, I am trying to follow my own recommendation and am now in the process of massively reconstructing my personal suburban beeyard.

I bought a garden shed (or a gambrel-roofed storage barn) and had it put near my three colonies. My early mental design was for a shed *specifically* for my bees but I simply could not afford that luxury. So I had a 16x20 foot storage building put up that I will partially use for bee equipment and partially use for storage. Presently, tall spruce trees border my colonies on two sides. Next Spring, I will fence the remaining two open sides.

In this very early stage, I had to deal with some issues that were not unexpected. They were:

(1) I had to get a building permit from the city to put the building on my lot. It cost me $70. Obviously, yours may be more or less.

(2) I really didn't want to have to move my three colonies, so I was very specific that bee colonies were nearby when I called the company that put down the gravel base and when I spoke with the barn company that built the storage barn. I met no resistance from either, but I can't lie. When they were all back there with all their machinery, I was anxious – fortunately, everything went fine.

(3) I had to do a bit of investigative work to determine how much larger the present trees were going to become. I didn't want the storage barn so close that, as the trees grow, the yard would become crowded in years to come, but neither did I want the barn so far away that more fencing would be required. Let me get back to you in 10 years to tell you how I did on that guess.

My bee equipment storage barn under construction.

If you don't mind, I will give you an update on this project next Spring/Summer as I am able to make it move forward. I will still have my bees roam the neighborhood. I will still have to go onto my neighbors' property to chase swarms and I (and my bees) will still be blamed for all hymenopterous stings, but at least my grand kids won't have direct access to my bees. I hope it helps with my family's attitude toward my bees. BC

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TIP OF THE ICEBERG

Jerry Bromenshenk

IVDS, Genomics and Proteomics – Buzz words for honey bee health!

A few weeks ago, my business neighbor, Dave Wick of BVS, Inc. (Biological Virus Screening) completed analysis of more than 600 bee samples using the Integrated Virus Detection System (IVDS) shown above. His IVDS instrument was purchased with contributions from the beekeeping community, and he has licensed the technology from its developer, the U.S. Army's Edgewood Chemical and Biological Center (ECBC).

As Dave began processing samples numbering in the 700 range, we took the opportunity to see what he had found. Overall, IVDS has repeatedly identified more than 30 different virus-sized particles in bee samples from across the U.S. Some of these were rare, or at low concentrations, and others occurred frequently, sometimes at very high concentrations. A few were common, such as a 32.2 nanometer sized peak that appeared in as many as 60% of a beekeeper's samples. Based on preliminary confirmatory work, Dave suspects that the 32.2 nm particles may be sac brood.

A striking observation was that individual bee operations tend to display unique patterns with respect to the diversity and amounts of viruses in bees. After running several samples from a given beekeeper, Dave could often identify the owner based on the viral assemblage in the bees. As he went from analyzing samples from one beekeeping operation to another, Dave sometimes checked and re-checked his instrument, because the differences were so striking. But he learned that it wasn't a problem with the IVDS instrument; rather, it was a reflection of the distinct differences between the samples.

Dave even found a few samples with virtually no detectable viruses, and some with only one predominant virus. At the other extreme were bee samples with as many as seven to nine different virus-sized particles at moderate to high concentrations. This Fall, a few beekeepers have begun conducting trials using a variety of treatments and management options, and then sending bee samples in for IVDS screening.

Although it is too early to predict the outcomes of these experiments, Dave has already seen pre- and post-treatment bee samples that differ in terms of viral loads. In some cases, there was a dramatic improvement as evidenced by lower levels and fewer viruses. In others, there was no change, or the bees had lost ground.

The Edgewood Chemical and Biological Center Team – front row from left - Samir Deshpande, Charles Wick, Michael Stanford, Patrick McCubbin; back row from left - Alan Zulich, Rabih Jabbour.

IVDS As A Tool

These observations demonstrate that some beekeepers are starting to use the IVDS as a management tool for assessing the effectiveness of treatments such as oxalic acid, dietary supplements, and transportation stress. It also shows that IVDS can 'see' induced differences in viral loads.

IVDS strengths are that it directly detects and quantifies viruses based on physical attributes, namely particle size and amount. In addition, the analysis process is rapid and relatively inexpensive. IVDS can detect any viable virus present in the sample, regardless of whether the virus has ever been seen or named before, or if it is an unknown. However, IVDS does not name the detected viruses. To provide names, assuming that the virus in question has been characterized, one needs to either isolate or find samples with a high concentration of a

given virus, then use complimentary technologies such as gene-based (genomic) or protein-based (proteomics) to provide the specific identification, which is what is being done with respect to the 32.2 nm detections that appear to be sac brood.

Unlike IVDS that directly looks at virus particles, genomics and proteomics employ indirect methods for detecting disease pathogens. Identifications are based on unique sequences of DNA or on proteins found in a sample that are indicative of specific disease organisms. Gene-based methods such as PCR are often used to distinguish species of *Nosema*. However, PCR and many other genomic methods tend to follow the one primer, one identification mode. For example, there is a primer for *Nosema apis*, another for *Nosema ceranae*, a third for a general screen for *Nosema* species. Each is time consuming and relatively expensive, especially if one has to use multiple primers.

However, a new genomics option is being developed by Joe DeRisi and his students at the University of California in San Francisco. When CCD first appeared, we sent samples to the Army ECBC lab. They in turn sent a subset of samples to Joe, and he was the first to announce the presence of *Nosema ceranae* in U.S. bees. We followed up with visits to his lab, worked on joint proposals, and introduced him to Project *Apis m.* (PA*m*). They are now providing funding to help Joe and his crew design and produce a genomic tool called a microarray that has been custom designed for bee diseases.

Microarrays

Microarrays have been referred to as a laboratory on a chip. The array itself consists of a microscope slide with lots of tiny wells or pits arranged in rows and columns. Each well has a bit of genetic material, and these bind with like material in the sample being analyzed. When that happens, the color changes. A person can see these changes under a microscope. Typically, individual wells appear as black, green, or red. Since a large array may have dozens or hundreds of wells, it has to be scanned by a digital reader. Identifications are based on which of the wells that have changed color. The DeRisi chip is being designed to include all known bee and many insect diseases. Joe and his crew hope to have a prototype chip available for testing early this year. When their microarray becomes available, the bee industry will have a powerful new tool for disease detection and diagnosis.

Proteomics

However, another powerful analytical tool, called proteomics is now available to the beekeeping industry through Bee Alert and the U.S. Army. The Army ECBC group, with which we at Bee Alert and Dave at BVS are working, has two major research thrusts: 1) IVDS, and 2) Proteomics MS (mass spectrometry).

Genes encode the production of proteins, which are made up of peptides. These biological molecules are responsible for the functional aspects of an organism. We used to think that one gene produced one peptide or protein. We now know that each gene can be associated with one or many peptides.

Proteins and peptides can be used to identify disease organisms in a manner similar to the same way that genetic material is used. In addition, proteomics can provide crucial clues as to the functional status of healthy and diseased bees. For example, some proteins are antibiotics. Others can either facilitate or block disease symptoms, or even turn specific genes on or off. In the realm of human health, proteomics is sometimes called the next step after genomics. Pharmaceutical companies are using proteomics data to look for new drugs or ways to design drugs that relieve symptoms and even block or turn off the genes of disease organisms.

New Virus

Dave Wick is using proteomics to put names on his IVDS virus peaks. Bee Alert has been working with ECBC to see what this tool can offer beekeepers. We have already documented the introduction into North America of a new bee and *Varroa* mite virus, *Varroa* Destructor Virus I. We first found this virus in two bee colonies from the east coast, and we now have seen it in one western bee colony. Currently, we are working with ECBC to verify the identification of two other bee viruses, each of which was revealed by proteomics MS, and neither of which has ever been reported in North America.

We also have discovered that proteomics MS is as close to being the 'one analysis for all things' as we can expect to find. For example, in any given bee sample, we can identify any of the known bee diseases (viral, fungal, bacterial, microsporidian such as *Nosema*), other insect diseases, plant disease pathogens brought back to the hive by bees (which now number over 200), and we are seeing striking changes in the microbial communities inside healthy, failing, and collapsed bee colonies. For example, healthy colonies tend to display lots of plant viruses, failing colonies exhibit an increase in bacterial pathogens and bacterial phages, and failed colonies show signs of mammalian diseases such as hanta virus.

In early December the California Beekeepers Association funded a proteomics survey proposed by Bee Alert and ECBC. The association will pay half of the costs to analyze 100 bee samples from across the state. These samples will be collected prior to and just after almond pollination and again toward the end of the Summer and honey production.

We hope to find 10 beekeepers in the southern part of the state, 10 in the central part, and 10 in the north who will send us samples at three times of the year and pay the matching half of the analysis costs. Ideally, they may elect to send a fourth sample in the Fall of the year. The purpose of this study is to benchmark and profile the health status of California bees. The data will help the participating beekeepers assess the functional health of their colonies, and it will provide the California Beekeepers Association with a data set that should provide a cornerstone for research into ways of improving the health of colonies. We hope that other beekeepers and bee associations in other states would set up a similar monitoring program. The power is in the data. Proteomics accesses a data base of over 64 million known peptides. Unto itself, it is a powerful diagnostic tool. Proteomics data from across North America could provide a data set that beekeepers and researchers could use to look for solutions. BC

Jerry Bromenshenk conducts honey bee research at the Univ. of MT in Missoula, and is President of Bee Alert Technology, Inc.

'Bout a 100 – Sideline Beekeeping

FACING THE CHALLENGES OF SIDELINE BEEKEEPING - HONEY

Larry Connor

Honey: Too Much or Too Little

Two issues back I listed 10 challenges facing mid-sized beekeepers in the United States. We have discussed queen problems and bee forage/nutrition. Next on my list of challenges facing sideline beekeepers is the subject of Honey: Having too much or too little.

Finding that Balance

I am never sure what the motivations are when someone starts with their first hive of bees. Newbees frequently talk about a lot of things – from pollinating the garden to having fresh honey for the table. Some not-yet-beekeepers tell me they want to get bees because they own some property and want to have bees there. An old friend wants me to put bees 'back' into an old bee tree just like his father had. I had to explain that is I not as easy or as legal as may seem. He just wanted to watch the bees fly in and out of the old maple while he trimmed the hedge, I guess. Other new beekeepers point to their flock of children and say that they want to raise the kids on honey instead of sugar. These folks are usually passionate about becoming beekeepers and producing a lot of honey. Frequently the older children are helping with the bees, which is an excellent idea.

At some point every beekeeper runs the risk of being blessed (some say cursed) with a large crop of honey. Honey production is highly variable even for established beekeepers. Professional and semi-professional beekeepers attempt to level out the honey production by using several techniques:

1. Chase the nectar crop – Find the areas where you can place hives that will almost always produce a honey flow from a certain group of flowers. This may be a woodsy area with basswood (more dependable as a nectar producer) and black locust (undependable). Both trees may bloom when the weather turns cold and rainy, and the flow is extinguished. By the way, rain does not wash the nectar out of the flowers, but for the most part, the nectar is reabsorbed by the tree or plant and the sugar energy is stored for future use. That may be in nectar production the next day or used for plant growth.

Other crops are worth moving bees for production, or setting up permanent apiary sites. I would seek plants like sweet clover, spotted knapweed, sunflower, purple loosestrife (where not being eradicated), goldenrod, and aster. Where grown, chase after the orange blossom honey, the tallow, the cotton and soybean flows (soybeans produce in only parts of the country where varieties and climate cooperate to produce nectar). Every part of the country, and every country on the planet, has unique nectar sources. One of the first things a new beekeeper MUST learn is the plants in his or her area BEFORE they will be able to move forward and grow a beekeeping operation.

2. Annual carry-over of last year's crop – The larger the beekeeping operation, the larger the chance of holding over buckets or barrels from the previous year. Many professional beekeepers hold honey because the price is low. Others hold honey because they want to make sure they have a guaranteed supply of a certain honey that is often hard to find, like buckwheat, mints, gallberry and other unique plants that are produced in limited areas or are only produced in small quantities. Storing honey may be an added expense. You must have a safe place to store the honey. It must be of low enough moisture that there will be zero fermentation and risk of loss of the crop.

3. Establish a network of reliable suppliers – It is my observation that honey from different states, but from the same nectar source, will produce a remarkably similar honey in taste, aroma and other physical properties. There may be considerable variation in the other nectar (and pollen) producing plants that contribute to the ultimate product, so there will be variation in appearance (the most noticeable aspect). So clover honey from North Dakota may be water white, but from Pennsylvania it may be mixed with a large number of Summer wildflowers that darken and change the flavor. So here is my advice: find someone who is producing honey like your own, from the same plants but also from similar conditions. If you are a 200-colony beekeeper you may want to find a 2,000-colony operation in your state or a nearby state that will

Comb honey frame with legs. Small pieces of triangular plywood are fastened to the ends of the honey frame to allow a plate to be placed under the honey and allow the customer to keep the honey on the table for daily use.

Acacia and Spring flower display in France. At the time of the visit the Euro was 1.28 US Dollars. The containers are half kilo in size. The unique nectar sources in France demand higher prices.

be able to supply you wholesale honey, allowing you to have continuous sales of honey from year to year and all year long. But don't just assume that the larger producer will have three barrels of blueberry honey in April next year. It will probably be gone when you call in late March to place your order. Instead, you must communicate in advance, and let him or her know that you are short on your crop and that you will most likely need extra honey to get through the year. Agree to a date you will commit to the order and when he can sell to someone else. Cultivate these relationships carefully, and do not abuse the supplier of honey you need to purchase to fill in the gaps in your production.

4. Establish a seasonal rather than year-round market – Semi-professional or sideline beekeepers are certainly entitled to be seasonal in their honey sales. You may produce 500 or 5,000 jars of honey this year and attempt to sell them all from September to December. This eliminates the cost, inconvience and daily pressure of keeping a shop open all year long. It requires that you educate your customers, in advance, of the nature of your business. A sign posted at the cash register should read: We will close December 31st and reopen September 15 next year. A flier or postcard in the customer's sack or box of products should reinforce this idea. I grew up on a farm that sold apples, and the season ran from late August to about Thanksgiving. After that the apples were in storage for a few months, but were used to meet the needs of a certain grocery store. By mid-Winter, even the best 'keepers' were past their prime and were sold off or discarded. As an industry we look at honey as an international commodity, but as semi-professionals, we see honey as a fresh farm product that should be sold like other seasonal products are sold. This may completely rewrite your business plan, but it is one that you can accept: get the money into the bank during two to four months of the year and have it available as the bills for equipment, sugar and bees come in the next season. I think the short selling season reduces your costs and frees you to do other things for yourself and for your bee operation.

Jar containing a mixture of creamed honey and bee pollen.

5. Have a plan for year-around retail markets – You have worked hard to get shelf space at the local health-food store, and it is imperative that you have honey on the shelf 12 months a year or the shop owner will give your space to someone else. How should you approach that sales and marketing situation? One approach might be to consider having two lines of product. One is based solely on your honey production in the county or corner of the state where you live. If you sell clover honey from North-East Kansas on your label, you should not sell honey from across the line in Missouri, even though the honey is essentially the same (the problem here is how you have written your honey label). But you could just as easily have two products. You could have honey labeled that says that it is certified to be from Beeville County, demanding a much higher price (to justify the extra expenses), and placed on the shelf as it is available. Once it is gone, it is gone. You do not attempt to find like honey to fill the space. Instead, have a second line of Mid-west honey, that you can supply year around, but purchased from beekeepers in your state or nearby states, and containing a product that is a lot like your own. This might be a little bit less in price, but not too much, since you are attempting to fill the upper end of the market with locally produced honey, and you are selling a seasonal product year-round. You are NOT selling honey as an international commodity, with honey purchased from foreign countries and sold at a discount. There are already plenty of professional packers who do this well, and probably at a much lower price. You MUST sell your unique location, of where the honey is produced.

6. Develop a floral market for your honey – In November I was in southern France and was once again amazed at how they are able to sell honey in small containers at very high prices. Why? Because they are selling a locally produced, floral based product that both the local consumers and the tourists are willing to buy. There were jars of chestnut, rosemary and lavender honey for sale, as well as honey from certain regions of France, Italy and Spain.

One of the concepts I want to share from France is this: You do not need to have a huge number of hives to make a living there if you know how to sell your honey. You may be able to be a full-time professional beekeeper

French Honey Shop.

with 400 colonies. These colonies maximize production, produce a range of products (honey, comb honey, honey vinegar, mead, beeswax and candles, propolis ointments, royal jelly), and sell at a home shop at a premium price. For many years the French beekeepers have created unique products. For example, I visited one retired postal worker who makes a number of unique products. He has considerable production in comb honey. He also makes and sells a creamed honey and a pollen mixture that is very popular with a certain segment of his market. He also sells a frame of comb honey that he has added a narrow triangular piece of wood to the end bars so the frame stands alone on the table. A plate is placed under the honey to catch any drips as the honey is cut from the frame and consumed. The honey can stay on the table for morning coffee. It is a simple concept, but it means the beekeeper has educated his customers on what the product is (local honey produced in a frame with thin foundation), and that the honey is locally produced. While some U.S. beekeepers might discount such a product, considering it a form of bulk honey, this is not the case in France, where this is sold at a premium and the price is high. In a country where many people purchase bread every day and carry it under their arm while riding their bike, the emphasis on locally produced, fresh product is extraordinary.

You control the way you answer the question or challenge of too much or too little honey. If you are new to beekeeping and produced 200 pounds per colony in Michigan in 2008, tell yourself that it was an exceptional year. Next year you may be like the beekeepers in Virginia, where the honey crop was close to being a failure. It is the nature of honey crops to be variable, and we as beekeepers are limited in our ability to control nature. For the sideline beekeeper it is a real challenge to find a workable plan to address this challenge. BC

Dr. Connor is currently planning road trips for 2009. He has preliminary plans to be in Oklahoma and Texas in April, and is trying to plan a queen rearing and bee-breeding program for the Northeastern states in the Spring. If you are on the way to or from these locations, and want to plan a visit, contact him at ljconnor@aol.com.

Meeting Minutes

Ann Harman

Planning a meeting, for 1 or 100, requires forethought and planning.

A good meeting just does not happen all by itself. Behind every successful meeting is a group of people who paid attention to details. Yes, the speakers get the applause, and some organizers may receive thanks, but sometimes the only reward is the knowledge that the meeting was a success; the attendees went home happy. They will come back again and let's hope they tell their beekeeping friends to come with them. One sign of successful meetings is the growth in attendance.

The officers of an association are the core of organizing a meeting. But a handful of volunteers is necessary to make everything run smoothly. So often those volunteers are lassoed at the meeting itself. Some don't mind. However, it is so much easier to make a list of those things that need attention and contact the helpers a couple of weeks before the meeting. In this way you know they are coming and they know what to do. Let's look at some of those details that volunteers can take care of.

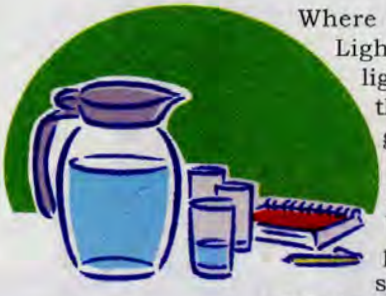
The meeting is at a venue new to the beekeepers. Some will use your newsletter directions and some will use MapQuest. But MapQuest does not show which side of the road for the destination. GPS systems vary in their ability. And, of course, road construction sometimes appears on weekends. ***Good signs are essential.*** One rainy day I followed a trail blazed with sodden pieces of copy paper that I assume had "bee meeting" printed in too-small letters. Bright yellow signs attract attention. Inexpensive, weatherproof signs, with metal legs to stick in the ground, should be owned by every bee association.

Now you need a volunteer: Meeting Sign Volunteer. This person has to be able to put the signs out early enough so that your vendors and volunteers, as well as the early-bird beekeepers will see them. However, Meeting Sign Volunteer's job is also to collect the signs after the meeting at a convenient time. If the signs will be passed on to another meeting venue, The Meeting Sign Volunteer is still responsible for knowing where the signs are and where they are to go for the next meeting. I am certain that somewhere in our galaxy are a large number of misplaced "bee meeting" signs pointing the way to a lumpy asteroid. Don't let your signs join them.

The beekeepers are arriving. Is your registration table all ready to receive them? I have seen lines snaking down the hall while boxes and computers are being unpacked and set up. Those beekeepers can smell the coffee but if they go to grab a cup they'll never get registration material before the meeting starts. Registration tables need to be ready for the very first early-bird beekeeper. How many volunteers do you need at the table? That depends on how many you expect to attend as well as whether a fee is to be collected, lunch can be bought and whether you offered preregistration. The Head Registration Table Volunteer needs to have plenty of helpers. And those helpers need to know exactly what their assignment is. Is someone taking in money? Do they have change? What about those paying dues? The association Treasurer needs to take care of that. When all goes smoothly everyone gets a cup of coffee.

Meeting venues may have different rooms for different parts of the meeting. Registration is frequently relegated to a hallway or entrance area. Coffee breaks may be in a room separate from the meeting room. Vendors may be with the coffee breaks or in an entirely different area. If you are having lunch at the venue, it may be in still another area. Yes, rounding up beekeepers to get them into the meeting room really is like herding cats. You need a Herdsman Volunteer. This volunteer needs to give a several-minute warning signal that the meeting is about to start, or break time or lunch time is over. Beekeepers are too busy talking about bees to pay attention to time. Blinking lights seems to be universally understood. If breaks are in the meeting room an announcement over the loudspeaker works. Shouting into various rooms does not work – everyone is talking and the noise drowns out the shouts. Besides, your mother told you "don't shout!" Think of something: ringing a bell or blowing a horn. I do not recommend "tanging" to make the swarm of beekeepers settle. That usually involved beating loudly on a metal pan and is not used by many beekeepers today.

How many times have you been to a meeting and heard the words "Would somebody get the lights?" The speaker is at the podium; the first slide is on the screen.



Where *are* the light switches? Lights go on; lights go off; lights get dim; and finally the switches and dimmers get figured out. When the presentation is over you hear again "Would somebody get the lights?" The person who worked the switches at the beginning left the room sometime during the presentation. You need a Light Switch Volunteer who would, before the meeting begins, find the switches and, once found, determine what they do. Then the lights will work smoothly all day.

Now, not all venues have appropriate lighting. Frequently the audience appreciates enough light to take notes. However, the screen area is better with little light. But the speaker needs to be able to see. You don't want speakers tumbling off the stage. Your Light Switch Volunteer will have to figure out what is best in that particular room.

Many associations, particularly large ones, have door prizes that have been donated by equipment suppliers and sometimes by beekeeper crafters. Door prizes are nice and can contribute a bit of fun to a meeting. You and your membership are the only ones who can decide whether to have them or not. If you are having door prizes, of course you need the Door Prize Volunteer. This may be one of your officers or a volunteer member of the association. Door Prize Volunteer actually has a number of tasks.

First, the prizes must be solicited from equipment suppliers in enough advance time of the meeting to insure their delivery. Sometimes door prizes can be acquired from local businesses.

The Door Prize Volunteer needs to open the packages and generally prepare then for display at the meeting.

The Program Chairman, the President, and any other officers involved with planning the meeting really have to take into consideration the time allotted to door prizes. If a speaker is told 45 minutes are allowed for the presentation and the first five to 10 minutes are taken away for door prizes, it causes the speaker to somehow eliminate those five to10 minutes from the presentation. Either that or the meeting begins to run late – and later and later, as the day goes on. Door prize time must be built into the program or the way of doing the prizes has to be changed.

Several options do exist for door prize time. They can be used if the meeting day seems crowded for time. At the Heartland Apiculture Society conference in 2008 a bulletin board was used. Door prize numbers were drawn at an appropriate time and the name of the prize and the winning number were tacked to the bulletin board. Attendees could check the bulletin board at their leisure, then present their part of the ticket with the ticket and listed prize to redeem their winnings. Special prizes, which are usually only a very few, had their numbers called to the audience at the end of the meeting. Another approach, that works if lunch is served at the venue, is to call the ticket numbers and award the prizes just as everyone is finishing lunch.

It's break time. Coffee, tea, donuts, honey cookies await. Yes, another volunteer is needed – the Break Table Volunteer. Actually unless the attendance is small, two volunteers can do a better job. First of all the table needs to be set up with the necessary cups, napkins and all the rest of the items needed. Are there really any coffee urns that don't leak onto the floor or table? I wish a good solution to those could be found instead of great wads of paper napkins. I guess we just have to accept the drippy ones and make the best of it.

During the break the Break Table Volunteers should be standing by, ready to remove empty donut boxes, replenish the cookies, remove abandoned cups of coffee and generally insure that all is well. Don't think that work is over at the end of the break for Break Table Volunteers. There's the cookie that fell on the floor. Crunch! Crumbs. There'll be another break later in the day. Clean up the floor. Get rid of the great wads of coffee-soaked paper napkins. Prepare the urns for the next break. Are there enough sugar and sugar substitute, creamer, stirrers, napkins?

The afternoon break table should look as nice and be as well-stocked as for the first break time.

If lunch is served at the venue it is possible that your Break Table Volunteers will help with that. However, your host association may have serving and cleaning up quite well organized. If the attendees must leave the venue for lunch, be forewarned that you have nobody to herd them back to the venue. Years later restaurants probably have a few tables of beekeepers still sitting and talking, oblivious that the meeting went on without them. Perhaps they will rejoin the audience at the next nearby meeting.

You can certainly have other kinds of volunteers helping at your beekeeper meetings. Take a look at your program and mentally walk through it. Think back to the last meeting to look for problems. The time to solve those is well in advance of your next meeting. Just remember, the attendees are not really going to notice that the day flowed smoothly. But they will remember the times it did not!

Wait a minute! You're not through yet. At an appropriate time during the day, when you have the full audience in the meeting room, you need to thank your volunteer crew and give them as much or more applause as the speakers. After all, the volunteers made the day! BC

Ann Harman is still planning and organizing meetings from her home in Flint Hill, Virginia.

Stopping NOSEMA

Robert A. Cramer, Jr.

Nosema infections have become a hot topic of late as attempts to uncover the cause of bee losses across the country increase. For a long time it has been thought that *Nosema apis* was the causal agent of *Nosema* disease in European Honey Bees in the United States. The tried and true method for treatment was and still is fumagillin B. However, recent data from research labs across the country has revealed that *Nosema apis* has been or is being replaced by *Nosema ceranae*, a species of *Nosema* most closely related to *Nosema bombi* and originally found in the Asian Honey Bee. Thus, many questions remain to be answered about the potential host switch of *Nosema ceranae*. For most beekeepers, the question is, how does this affect me and my operation?

Research on the implications of *N. ceranae* infections in European Honey Bees is ongoing and many questions remain unanswered. Studies in Spain have implicated *N. ceranae* infections with colony collapse disorder in that country. However, similar symptoms of the disease in the United States have not been widely reported and specifically undefined. It is clear that much remains to be learned regarding the implications of this host switch to beekeeping operations in the Unites States. Still, the incidence and temporal aspects of *Nosema* infections in the U.S. *do* seem to be changing. Many beekeepers report high spore loads throughout the year and some report that these high spore loads adversely affect their colonies. Others report high spore loads but little impact on the colony.

Moreover, there are reports that fumagillin B treatments effectively control *N. ceranae,* but there are also reports that suggest it may not be as effective against *N. ceranae* as *N. apis*. Regardless, one potential mechanism to help limit the spread of this likely important bee pathogen is comb and equipment *sterilization*. While the exact mechanism of transmission has not been uncovered for *N. ceranae*, starting the season with clean combs and equipment has great potential to minimize the spread of this and other diseases of honey bees. Consequently, with the financial support of the California Bee Keepers Association, we tested the efficacy of several commonly available compounds for their ability to kill *N. ceranae* spores. Briefly, with the help of beekeepers, we collected bees infected with *N. ceranae* and isolated the spores from the abdomens. The spores were subsequently treated for one to three hours at room temperature with the various compounds and then examined for viability. Interestingly, we found that two treatments, previously reported by some beekeepers to be effective in eliminating bee disease, were effective in killing *Nosema ceranae* spores.

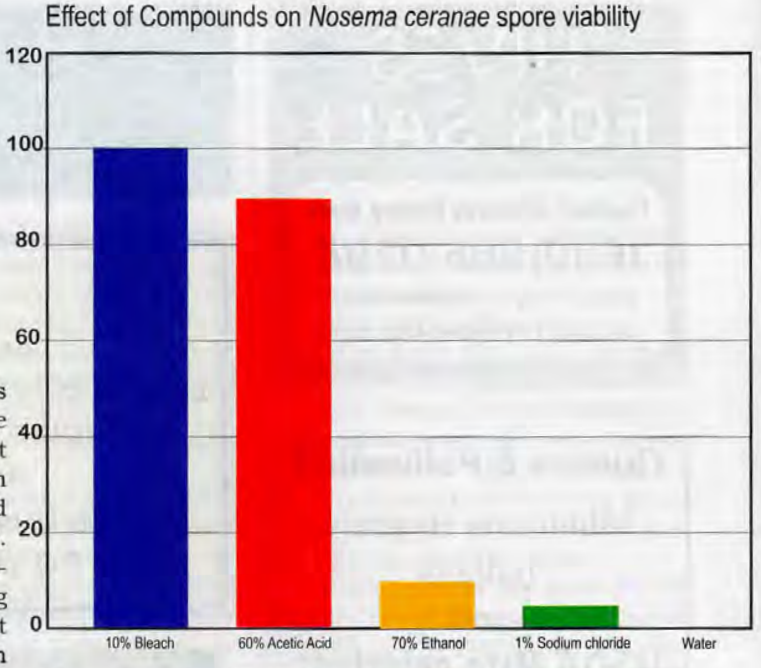


Figure 1. Effect of compounds on *Nosema ceranae* spores in a laboratory setting. *Nosema* spores were treated with the compounds above for three hours at room temperature then examined for viability with a flow cytometer. 10% bleach and 60% acetic acid have severe effects on the spores indicating that they likely would be good options for sterilizing combs and equipment. *Note: The effects of these compounds on combs and equipment has not been tested in our laboratory.

By far the most effective compound was a simple 10% bleach solution. In addition, a concentrated 60% solution of acetic acid was also highly effective at killing the spores. Consequently, our results suggest that several cheap and readily available compounds can be used to "sterilize" combs and equipment.

The question remains on how to effectively apply these compounds on a large scale that would make their use cost-effective in large commercial beekeeping operations. For the hobbyist, the small number of colonies would seem to make treatments rather facile. Simply incubating combs and used equipment in 10% bleach for a few hours would be highly effective in minimizing the transmission of *Nosema* spores from one year to the next. To make a 10% bleach solution, purchase one gallon of your favorite bleach and mix with nine gallons of water. Bleach of course is caustic to the skin in concentrated doses, so care should be taken when mixing and applying the solution.

Other compounds will continue to be tested in our laboratory. We should caution that this is not a *cure* for *N. ceranae* infections in colonies that are already heavily infected. The effect of these compounds on the bees themselves remains to be tested and whether or not they would be effective inside the bees against the spores is unknown. Yet, starting the season with equipment free of potential pathogens may help decrease the incidence of bee losses across the country. BC

Robert A. Cramer Jr., Ph.D., Montana State University, Department of Veterinary Molecular Biology, Bozeman, MT 59718.

Religion, Politics & *Bees*

Peter Sieling

Dr. Dewey* and his wife Natasha* decided to invite several couples to dinner. "Let's ask people who don't know each other, as a psychopathological experiment," suggested the Doctor. "Perhaps the pressure of conversing with strangers will cause someone's head to burst. Bah ha ha ha ha!"

Three weeks later I stared into the mirror, fluffing my hair to make it look like it hadn't been pressed under a hat all day. I tried to remember what my wife told me: "Guns, sports, and umm..."

"What are you muttering?" asked Nancy.

"I'm trying to remember what I can't discuss with strangers."

"We've been over this already – religion, politics, and especially bees. Don't you dare mention any of those subjects!"

"Aw, what else is there to talk about?"

"Sports and the weather."

"I don't know anything about sports."

"Talk about football. Everybody knows about football."

"Is that the game where the ball has pointy ends and it's played on a grill?"

"Gridiron. Just nod your head and say you like the Buffalo Bills."

Forty-five minutes later I rang the Dewey's bell. The door creaked open. "Ah, the Sielings. Come in and take a seat," said Dr. Dewey. "May I take your coats? Let me introduce you to the others. Bah ha ha ha!" He ran through the names so fast I only caught the "Mr." and "Mrs."

I sat next to a man who gripped his armrests with white knuckles and stared at the rug. I couldn't see anything on the rug. Maybe he was thinking of buying a rug and wanted to memorize the color. I felt pressure forming in the back of my head.

Nancy frowned at me from across the room while talking with a woman. I had to say something. "Quite the err, weather we are having," I started.

"Yeah," he answered.

I tried sports. "Some game the other night, wasn't it?"

"I missed it. Who was playing?" he asked.

I had just guessed there'd been a game recently. They have sports news on the radio every day. Some teams must have played each other somewhere. "Oh uh, the Buffalo Bills and the ah, Buffalo Sabres...I mean the Boston Red Sox. I missed it, too." I almost slipped. You never hear about two teams from the same city playing each other.

"I'm not really into sports," he explained, "so I pretty much stick to the weather."

Mrs. Dewey herded us into the kitchen for the self serve smorgasbord. Then Dr. Dewey skillfully sorted the introverts into the dining room and the extroverts into the family room.

We ate quietly as the extroverts chattered, told jokes, and exploded with laughter. The introverted wives talked about whatever women talk about – hair, scrap booking, hot flashes, and grandchildren. "Jim" and I went back to the weather. From blizzards we managed to segue into heating systems and coal. Jim not only heats with coal, he collects coal specimens. His coal collection contains chunks that fluoresce under a black light. I told him about the anthracite museum just a couple hours away in Pennsylvania, an attraction I never quite had time to visit. Somehow coal lead into winter and hibernation and bears and ... I could see Nancy tense when I mentioned bears because the subject of bees always follows bears. She cleared her throat and jabbed me under the table.

"Hey, ow!" I bit my lip.

"Why don't you have seconds, Dear?" She smiled sweetly at me.

"Yes, Honey." I had a feeling like someone had inserted an air compressor hose in my ear and was pumping air into my head. It was up to 90 psi – it could burst at any second and ruin my appetite for dessert.

While refilling my plate in the kitchen I heard the words, "...10 or 15 colonies..." I couldn't believe it. Jim had mentioned the bears at his bird feeder and Nancy told him a bear had visited our beeyard when I forgot to charge the fence battery. Jim asked how many colonies we owned. He used to keep bees, too!

"I read about the Collapsing Colony Disorder," he said. "You ever get that?"

"I've suffered from Collapsing Colony Disorder for years. I wish I'd notified one of the bee labs. They'd probably have named it after me—Sieling Collapse Syndrome."

"That's already taken," Nancy added. "Your therapist submitted an article to the American Psychological Association."

We talked mites over lasagna, bears and swarms over raspberry tarts, and stings over coffee. You could almost hear the air hissing out of my ears as the pressure returned to normal.

Dr. Dewey herded us into the family room. We played Taboo, a word game, men against women. The men won.

As we left, Dr. Dewey seemed a little deflated. No one's head exploded. But I learned that you can discuss taboo subjects with strangers, at least if they ever owned bees. BC

**Names changed to prevent retaliation.*

Peter Sieling prefers hiding in the woodshop at home in Bath, NY, where he builds beekeeping equipment, and writes an occasional article for us.

Garden Books For Beekeepers

Connie Krochmal

For a gift or for yourself – these are some good choices for every beekeeper and gardener.

Whether you're buying a book as a holiday gift or for yourself, the following gardening titles are some of my favorites. Those with bee gardens will find these are helpful in selecting plants and maintaining their gardens.

"75 Remarkable Fruits for Your Garden"

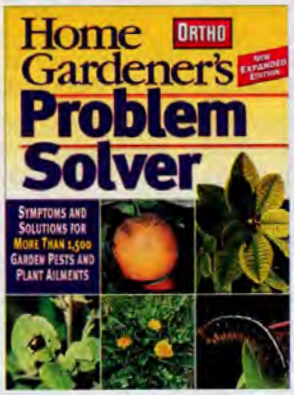
With fruits being such wonderful sources of nectar and pollen, this fruit book will be very useful to bee gardeners. Written by Jack Staub, it has lovely watercolors by Ellen Buchert. It was published by Gibbs Smith. This hardcover is the second in a series by the author.

While some of the fruits are tender species like figs or oranges, others are perfectly winter hardy in cold areas of the country. Every type of fruit is represented from traditional tree fruits and vines to strawberries. In addition, ornamental landscape plants with edible fruits, such as the Cornelian cherry (a type of dogwood), are included.

Written in an engaging style, the in-depth fruit profiles provide the Latin and common name, descriptions, tips on growing, and recipe ideas. Readers can also learn about the rich folklore and history of each plant.

"Home Gardener's Problem Solver"

The new expanded edition of this classic Ortho title is now available. This book presents a quick and easy way for beekeepers to know what is wrong with their plants and what to do about it. Published by Meredith Books, this user-friendly guide has the symptoms and solutions for over 1500 plant problems. This covers everything from poor growing conditions and weather to animal damage. With over 600 pages, it is hard to find a more comprehensive book on the subject.



A separate section is devoted to each plant group, such as tree fruits. By using the color coded bars along the top margins of the pages, you can quickly find the appropriate section.

Each section begins with a general introduction to the most common problems for that group, such as lack of pollination. Following that are specific problems for each individual plant species. The plants are listed alphabetically by common name. This explains how to prevent and correct each problem. For quick reference, there are handy charts, including one for fruit tree diseases.

This book offers several ways to identify your plant's problem. Start with the section for that particular plant group. Or go straight to the section for that kind of problem, such as plant diseases.

The extensive index has both common and Latin plant names.

"Gardening 1-2-3"

For those new to bee gardening, this Home Depot title is essential. It covers everything from choosing plants and gardening techniques to plant care and landscaping. Featuring over a thousand color photos, this quality hardcover was published by Meredith Books. It provides all the basics in an easy to follow style.

It walks you through the entire gardening process, beginning with how to determine your growing conditions and region. This title also includes step-by-step, illustrated gardening projects. Readers will learn how to prepare the soil, how to transplant, propagate plants, and all aspects of plant care.

This title deals with both edible crops and ornamentals. It devotes particular attention to specialty gardens, such as wildflower gardens and native plant gardens.

With the plants arranged alphabetically by common name, the extensive plant encyclopedia takes up about half of the book. The plant profiles present everything the gardener needs to know, including a plant description, its growing needs, routine care, landscape use, recommended varieties, and a color photo.

"Organic Gardening-The Natural No-Dig Way"

By Charles Dowding, this British title was published by Green Books. It is distributed in the U.S. by Chelsea Green. This title offers busy bee gardeners a simple and easy way to grow organic vegetables, fruits, and other edibles in raised beds. The book is based on the author's personal experience as an organic grower in Britain during the past 25 years.

Illustrated with lush color photos, this is an excellent introduction to organic gardening. This brings a refreshing tone to the subject. The author deftly avoids the hype one often associates with organic gardening. Readers can learn what to grow, when to plant, and how to care for the garden. There's also a chapter on gardening by the moon.

Much of the book is devoted to the crops with a separate chapter for each group or type. There are in-depth growing instructions for each kind with charts listing the varieties, sowing times, and spacing. This even includes a section on growing fruits and nuts in containers. All measure-

ments use the metric system. This also has recipe ideas as well.

"Doug Welsh's Texas Garden Almanac"

Each region of the country presents unique opportunities and challenges for bee gardeners. That's where regional gardening books come to the rescue. There are also titles for some individual states as well.

None of the other state gardening books can match this title for Texas. With over 500 pages, this flexbound, down to earth title was published by Texas A & M University Press. This features watercolors by noted artist Aletha St. Romain. It has lots of maps.

To find out what is in bloom or what needs done in the garden, just turn to the appropriate month. This covers all of the basic gardening techniques. Throughout the book are handy charts, plant lists, and tables as well as sidebars with quick gardening tips. A broadcaster and writer, the author wears many hats. He is the Texas Master Gardener program coordinator and extension horticulturist with Texas A & M.

"Baer's Agricultural Almanac and Gardener's Guide"

When it comes to almanacs this one can't be beat. The 2009 edition marks the 184th year this American classic has been available. Published by John Baer's Sons, both individual copies and five year subscriptions are available.

This is edited by Gerald S. Lestz, and beautifully illustrated with line art and photos. From cover to cover, this is brimming with helpful charts, tables, and all kinds of gardening information. Bee gardeners will find the seed planting tables and vegetable planting charts are very useful. These tell when to plant, how much seed is needed, spacing, and so on.

Busy folks will appreciate the handy procrastinator's planting guide that lists the last planting date for various vegetables. Readers can also learn about gardening by the moon and the zodiac signs. The almanac features month-by-month gardening tips and plant lore. For each month, a chart shows the phases of the moon and location of the planets along with long range weather forecasts.

"The Encyclopedia of Hardy Plants"

For bee gardeners in cold climates, this title by Derek Fell is invaluable. It was published by Firefly Books. It covers ornamentals, herbs, and edibles. Though the dust jacket doesn't indicate how many plants are featured, it likely covers around a thousand kinds or so.

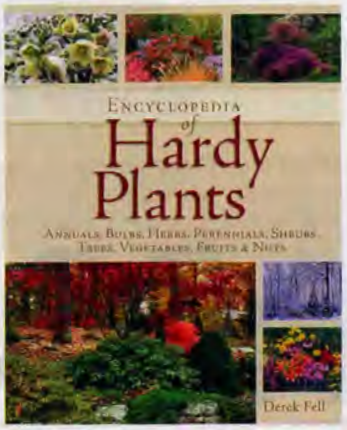
For this book, the author chose hardy, 'iron-clad' plants that can survive severe Winters. The introduction provides everything bee gardeners need to know about plant hardiness, hardiness zones, and the factors that affect hardiness.

This encyclopedia devotes a chapter to each plant type. Among these are bulbs, herbs, perennials, shrubs, and trees. In the case of vines, each one is incorporated into its respective group, such as English ivy under shrubs.

Bee gardeners will also find helpful chapters on hardy annuals and vegetables. These can be planted in the Spring before the last frost or during the Fall months.

Within each chapter, the ornamental plants are arranged alphabetically by Latin name. Each plant profile contains a photo, description, propagation methods, details on plant care, the preferred growing conditions, hardiness zone, and use in the landscape. When available, specific varieties are also recommended.

In the chapter on fruits, there is detailed information on pruning and plant care. For vegetables, this gives the typical time to maturity.



This is lushly illustrated with photos by the author. There is both a common name and Latin name index.

"Great Landscape Evergreens"

By Vincent A. Simeone, this quality hardcover was released by Ball Publishing. This is part of a series, which includes "Great Flowering Landscape Shrubs."

Despite the title, this book is by no means limited to evergreens. In fact, the author focuses on trees and shrubs that can be used for screens and hedges. Beekeepers who are planning such plantings around their apiaries will find this is a great source of information.

This also provides extensive details on evaluating the planting site and choosing suitable plants.

Separate chapters are devoted to conifers and broadleaf evergreens. Deciduous and semi-evergreen shrubs are combined into one chapter. Within each chapter, there is an introduction to that particular group. The plants are arranged alphabetically by Latin name.

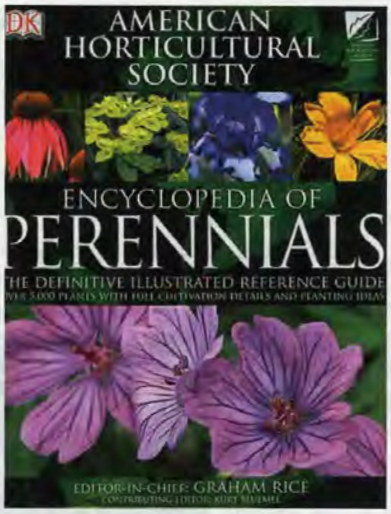
For each species, there is a general introduction to the genus, an in-depth plant description, details on its cultural needs, suggested landscape use, hardiness zones, routine plant care, and color photos. In some cases, the author presents specific varieties or cultivars.

Beekeepers will be particularly interested in the deciduous, semi-evergreens, and broadleaf evergreens, many of which are nectar/pollen plants.

The appendix has all sorts of useful information, including a list of the top 15 screening plants, a list of mail order nurseries, and a glossary of landscape terms. The index has both common names and Latin names.

"Encyclopedia of Perennials"

Perennials are a mainstay in bee gardens. For that reason, I recommend this book for beekeepers. By the American Horticultural Society,



it is by far the most comprehensive book on the subject. This full color guide features over 5000 species and varieties, many of which are suitable for bee gardens. Released by DK Publishing, its editor-in-chief was Graham Rice.

With over 500 pages, this user-friendly guide is a pleasure to use. This covers everything bee gardeners need to know in order to choose appropriate perennials for their growing conditions and care for their plants. It lists the plants alphabetically by Latin name. For quick reference, use the common name index.

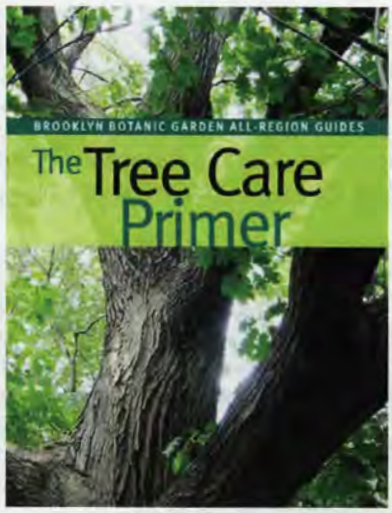
This has a complete profile for each genus, species, and variety. The encyclopedia entries cover the family name, the plant's origins, its native distribution, common names, propagation methods, size in inches and centimeters, preferred growing conditions, hardiness zone, tips on routine plant care, and special problems associated with that particular plant.

Throughout the book are sidebars with additional information, such as awards that a plant has received.

Careful attention is given to hardiness. This features large color versions of the USDA hardiness zone maps as well as the American Horticultural Society's Heat Zone map.

"The Tree Care Primer"

This is part of the Brooklyn Botanic Garden All-Region Guides series. Bee gardeners will learn everything they need to know about choosing and caring for trees. This explains how to evaluate your planting site and choose appropriate



species. It has tips on picking out top quality plants at nurseries and garden centers. This also explains the differences between container-grown and B & B trees.

This guide makes it so easy to choose suitable trees. A handy table lists the recommended species. This gives the name of each plant, its hardiness zone, its mature size, soil preference, and preferred exposure.

There are step-by-step, illustrated instructions on all aspects of tree planting and care. A section is also devoted to growing trees in containers.

This covers preventive and routine care that is required throughout the life span of a tree from newly planted ones to mature and ailing specimens. Particular emphasis is placed on proper pruning. It also has tips on protecting trees from severe weather and other problems. In addition, this addresses legal issues regarding trees along property lines and the economic value of landscape trees.

The appendix includes all sorts of helpful information, including a tree care glossary, a directory of mail-order nurseries and tool suppliers, and a USDA hardiness zone map.

This has lush color illustrations and line art. The index gives both the common and Latin names.

With good gardening books like these, bee gardeners can determine what plants are suitable for their needs and learn how to care for them. BC

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

Beekeeper's Daughter

Irene J. Guertin

A hobby is a lot like love – sometimes you actively search for it and sometimes, improbably, it finds you. In our case, it swarmed us. I grew up in rural Florida, a place people generally hurry through on their journeys across the state. Why the honey bees decided to settle in our yard is unclear, but suddenly there they were, clinging to each other in a cone formation in our live oak tree. People in our small town followed fire engines for entertainment, and in no time neighbors began gathering to stare at the large, rather menacing, quivering mass. The boys pretended to swat it with baseball bats.

Our Dad wasn't the biggest guy, and wasn't even an arborist or bee expert, but he had a couple of things going for him: he was fearless and decisive. He quickly assessed the situation and concluded that the bee power must be harnessed and properly housed, then and there. One good thing about growing up where we did: you could find a beehive when you needed one. In no time, he procured a simple white box with frames, cut down the limb, and coaxed them in.

Dad's military experience provided the perfect training for a budding beekeeper. He must have felt a kinship to them: Identically uniformed, on a mission, falling in so perfectly and unquestioningly behind their leader. They would work themselves to death for their queen or choose to go quickly, using their one round of ammunition to protect her. There was one glaring difference. This army was all female, with a few males relegated to reproductive duties.

The bees' new home was strategically placed at the edge of our backyard, as far as possible from the house and our allergic mother. The neighbors didn't complain, probably because we didn't object to the pungent cows and pigs in their yard. The original colony was joined by others that arrived not by wing but through the mail, the workers packed in screen boxes and queens tucked into their own matchbook-size compartments.

One shipment broke open and shut down the post office for the day, but once again, Dad rounded up the wayward travelers and brought them home. Our beekeeping operation took off, and over time, hives lined the yard like a row of crooked teeth. I proudly wore a t-shirt emblazoned with a giant bee, not realizing then how it contributed to my general nerdiness.

Bees get a bad rap, what with all the killer bee lore, but we learned that domesticated honey bees are quintessential good neighbors who live and let live. I would often walk among them, watching the endless frenzied takeoffs and landings in the pursuit and transport of their gold. Learning to stay calm in their presence helped me avoid a lot of stings and probably many other of life's ills.

We came to appreciate honey, that mysterious creation, its origin more complex than the most closely guarded recipe yet as simple as observing what grows nearby. The bees memorized that code deep in their DNA and worked their magic, turning pale watery nectar into dark, flowing amber. Our bees made theirs from orange and palmetto blossoms, with clover mixed in for good measure. Anyone driving through Florida's orange country in the Spring would do well to leave behind the theme parks and beaches, slow down, open the window, and take a deep breath. You will be treated to a heavenly scent too sublime and exquisite to be copied or packaged, even though many have tried; and that is a good thing.

'Robbing' the hive, as Dad called it, was a big event. He would don his pith helmet with bug screen, light the hand-held smoker, and get to work. Mom would quickly find something else to do, preferably out of the house. Sometimes Dad would forget to seal off a pant leg or sleeve and return covered with stings, yet he never blamed the bees; they were just doing their jobs. Besides, he said, it builds immunity to future stings.

We used a heated knife to slice the caps off of the frames of honeycombs, then placed the frames in the extractor. The extractor, fed by elbow grease and centrifugal force, whirled out the honey like strands of cotton candy. A few combs were sacrificed for chewing; most were returned to the hives to be refilled by a new generation of workers or recycled into candles. At last, we poured the finished product into dozens of gallon jugs destined for market, family, and friends. Not a very efficient or large-scale operation by today's standards, but successful by ours.

Our hives were occasionally destroyed by disease or other problems, their collective strength no match for the invasions. We viewed these losses as random events; after all, we could always get more bees. The recent news about the epidemic disappearance of pollinators is much more troubling. What is a flower garden, or even worse, our amazingly productive agricultural industry, without them? There's a lesson in this, about how a creature so small can make such a difference, in ways that bring meaning and sustenance to our daily lives. More and more, people are paying attention, whether by contributing to the larger cause of conservation, more locally, designing their gardens to attract pollinators or reviving beekeeping as a hobby.

Dad died long ago, the live oaks in my parents' front yard and the hives out back are gone, and I moved North. Beehives are nowhere to be seen in our tightly zoned urban neighborhood, but I still get my fix by stopping by our local nature center with my family now and then to watch its humming glass walled hive. Someday, I hope to explain to our young children what beekeeping meant to me – hard work, a disappearing craft, precious time with my father. And, to all the pollinators out there, may you not only survive but come back stronger than ever. BC

GLEANINGS

JANUARY, 2009 • ALL THE NEWS THAT FITS

INTERNATIONAL HONEY MARKET NEWS

The international honey market has entered a period of turmoil and considerable aberrational phenomena in import patterns have been observed. There has been great tension in the American honey market between a market for inexpensive "illicit" honey and the market for legal and reasonably priced honey. This tension is experienced by beekeepers, packers and importers.

Supply/Demand

The overall international supply/demand relations point to a firm honey market.

On November 7, 2008, the U.S. Federal Register published a preliminary ruling whose impact will be to both: 1) increase anti-dumping rates for Chinese exporters and 2) change the basis from ad valorum to weight for Chinese honey imported into the U.S. These changes may take effect as early as December, 2008. The anti-dumping duty rate will be $1.20/lb. which should put a floor price of about $2.00/lb. on all Chinese honey entering the U.S.A.

The clear intent of the U.S. Department of Commerce in making these changes is to stop the U.S. Customs fraud that is associated with gross undervaluation of Chinese honey entering the U.S. market. That this mode of fraud is serious is manifested by the fact that a whopping 6.4 million pounds of Chinese honey entered Los Angeles in the month of August valued at $0.22/lb. For the first eight months of 2008, the average customs value for imported white Chinese honey was $0.189/lb. By so grossly under-valuing the honey, the importers' cash deposit requirements became minimal. If, and when, the duty basis is changed to weight and the anti-dumping rate increased to $1.20/lb., the effect will be huge and the option of undervaluation as a means of circumvention of the intent of the anti-dumping orders governing honey will be lost. There may be huge retroactive duties associated with this change.

The two other forms of circumvention remain, namely: 1) Bringing in "honey" under the so-called "packers' blend" or other designations and 2) transshipping Chinese honey through third countries. The Chinese are talking of their new "joint venture" honey factories and businesses in Indonesia, Malaysia, India and Thailand.

There has been a surge of "new companies" with no history of importation of honey from countries with no history of producing those specific qualities and quantities which are appearing in the marketplace. For example, countries with tropical and semi-tropical climates tend to have flora sources that produce amber, light amber and extra light amber honey, not the huge quantities of white honeys that are produced in Canada, China, Argentina and the U.S.A.

Some of the surprising and aberrational trade patterns are indicated below.

India

A total of 38,312,000 pounds from India were imported in 2007, with 65% Extra Light Amber. Of the 24,520,000 pounds that entered in 8 months of 2008, about 41% was White, 17% Extra Light Amber, and 41% was Light Amber. In June, 2008, a report that antibiotics and lead were found in Indian honey led to talk of a ban on Indian honey in Europe and other international markets.

China

Chinese White Honey had an average customs value of $0.226/lb. for the month of August, 2008, and $0.189/lb. for the first eight months of 2008. These values are absurdly low, and have led to the imposition by the DOC of a per kilogram duty based on weight, not value as indicated by invoices. White Indian

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HAAGEN-DAZ DESIGN COMPETITION

Honey bees will soon find a pollinator paradise at the University of CA, Davis, thanks to Häagen-Dazs.

The ice cream maker announces it is making a $125,000 donation to the UC Davis Department of Entomology to launch a nationwide design competition to create a one-half acre Honey Bee Haven garden at the Harry H. Laidlaw Jr. Honey Bee Research Facility at UC Davis.

From that gift, $65,000 will be used to establish the garden.

Häagen-Dazs and UC Davis will determine how the balance of the gift can best be used to benefit the health of honey bee populations.

"The Honey Bee Haven will be a pollinator paradise," says Lynn Kimsey, chair of the Dept. of Entomology and director of the Bohart Museum of Entomology. "It will provide a much needed, year-round food source for our bees at the research facility. We anticipate it also will be a gathering place to inform and educate the public about bees."

The garden will include a seasonal variety of blooming plants to provide a year-round food source for honeybees. It is intended to be a living laboratory supporting research into the nutritional needs and natural feeding behavior of honey bees and other insect pollinators.

Visitors to the garden will be able to glean ideas on how to establish their own bee-friendly gardens and improve the nutrition of bees in their own backyards. The bee haven is expected to be the first in a series of pollinator gardens at UC Davis.

"The garden will be helpful in demonstrating bees are not a nuisance in the backyard, but are obtaining food and water essential for their survival," says Eric Mussen, a Cooperative Extension Offier.

"Campus visitors will be able to see which flowers are most attractive to foraging honey bees and how to space the flowers in order to have bees flying in the most convenient areas of their gardens."

The garden design competition is being coordinated by the CA Center for Urban Horticulture at UC Davis. It is open to anyone who can create a proposal by using basic landscape design principles.

"This is an excellent opportunity to raise public awareness of the current plight of honey bees and to educate the public on how they can help," says Dave Fujino, director of the CA Center for Urban Horticulture. "Planting a garden with honey bee friendly plants provides nutrition for the bees and has the potential to create valuable habitat corridors between agricultural sites."

Design submissions for the competition should describe a one-half-acre garden that can be installed for $65,000 or less. Submissions must include a site plan, planting plan, maintenance program and construction cost estimate.

Plans should include plant species providing forage for honey bees, a bee-accessible water source, and environmentally friendly paths for visitors. More design specifications and lists of bee-appropriate plants can be found at the UC Davis Dept. of Ent. website at http://entomology.ucdavis.edu/dept/beebio.cfm.

Design plans for the Honey Bee Haven garden must be received at UC Davis by Jan. 30. Plans should be mailed to the CA Center for Urban Horticulture, College of Agricultural and Environmental Sciences Dean's Office, Univ. of CA, One Shields Ave., Davis, CA 95616-8571.

The winning design, announced in February 2009, will be implemented, and the winning team will receive on-site recognition on the Häagen-Dazs commemorative plaque located in the garden. In addition, the winner will receive a free year's supply of Häagen-Dazs ice cream and will be included in a 2009 press announcement.

– Alan Harman

HONEY IN CUBA

Production of organic honey in Cuba's easternmost province of Guantanamo has almost doubled the forecast harvest to more than 40 tons, thanks to weather conditions that included perfect temperatures and well-timed rains.

Agricultura de Montaña group spokesman Fernando Trenzado tells reporters the organic harvest for the full year is expected to top 100 tons.

Guantanamo is the first province in the country to produce organic honey under international standards that include nectar sources in fields where fertilizer is not used.

Most of the organic honey is destined for markets in Canada, Japan and Europe.

– Alan Harman

MANUKA HEALTH

New Zealand's Advertising Standards Authority has upheld a complaint over an advertisement about health benefits of Manuka honey.

The authority ruled Manuka Health New Zealand Ltd. did not substantiate the claim that its honey brand had unique anti-bacterial properties that other Manuka honeys did not have.

It said the advertisement for Manuka honey trademarked with MGO, an abbreviation for methylglyoxal, breached a therapeutic products advertising code, as it was not truthful and balanced, and the claims had not been substantiated. The ad also breached rules by not observing a high standard of social responsibility.

The complaint was made by Prof. Peter Molan, a pioneer in researching Manuka honey used for medicinal purposes such as wound dressings who helped compile the unique Manuka factor rating system used by some companies promoting anti-bacterial properties of the honey.

The authority said the actual position was that Manuka honey was the only natural food so far identified with very high methylglyoxal levels - a statement which could be applied to all brands of Manuka honey.

Manuka Health New Zealand argues these properties can be more accurately gauged by measuring the content of the methylglyoxal.

Meanwhile New Zealand beekeeping officials are becoming concerned the rush to harvest the medicinal and valuable Manuka honey is hurting the bees.

The National Beekeepers' Association tells a television network that competition is so fierce for access to Manuka bush some beekeepers are putting too many hives on the same area of land, which can't support the bee population.

Association president Frans Laas says the problem is predominantly in the northern part of the North Island and there is a limit to what an area can support.

"If you put too many sheep on a farm they get hungry and bees are the same," he says. "If there is not enough food around for the bees, less honey is produced and there is the potential for them to starve."

Meantime, Manuka honey manufacturing and marketing company Comvita Ltd. reported a net loss of NZ$3.47 million for the 15-month period ended March 31 – almost triple the forecast result.

Revenue was NZ$65.2 million including sales up 41% to NZ$56.5 million.

"This is very much a blip, rather than a trend," Comvita chief executive Brett Hewlett says.

Comvita forecasts revenue of NZ$65 million to NZ$70 million this financial year and an after tax profit of NZ$2 million to $2.5 million. *– Alan Harman*

MISSOURI HONEY QUEEN

Tara Fisher, daughter of Mr. and Mrs. James Fisher of Raymore, MO was named the MO State Honey Queen October 31 at the state meeting. Tara is a student at the University of MO Kansas City. She worked the State Honey Booth this Summer and is available to help with markets and events in Missouri to promote honey.

APIS CERANA IN AUSTRALIA

Biosecurity Queensland is making a major push to find and destroy as many Asian honey bee nests and swarms as it can before the wet season sets in.

Primary Industries and Fisheries Minister Tim Mulherin says the annual rains would make surveillance for the Asian honey bees (*Apis cerana*) – which are host to *Varroa* mites - more difficult.

"They will take this opportunity to breed up over the summer and create an even bigger headache than they have this year," he says.

"While the *Apis cerana* we are dealing with at the moment are free of the destructive pest *Varroa* mite, it only takes a new incursion of a mite-carrying species to quickly spread it through our bee colonies. New incursions would be hard to detect if there are *Apis cerana* living in the area already.

"Mites are destroying commercial and hobbyist hives in America and New Zealand and we dread their appearance in Australia."

Biosecurity Queensland has destroyed 17 nests and swarms since the incursion was initially detected in May last year.

Biosecurity Queensland teams have found more foraging Asian honey bees and are hunting for their nests.

Mulherin says the public can help find swarms and nests of the Asian honey bee.

"If everybody took some time each day to check their trees, shrubs, outbuildings and under roofs for any suspicious bee activity, then we may be able to find established nests more quickly and prevent them from swarming," he says.

"A joint backyard blitz involving our surveillance teams and all Cairns householders will be an effective way to track down nests and swarms."

Mulherin says bird enthusiasts and residents are joining Biosecurity Queensland's hunt for Asian honey bee nests in the suburbs of Cairns.

"Biosecurity Queensland welcomes the extra eyes to help locate roosts of the rainbow bee-eater bird which will in turn help track down Asian honey bee nests and swarms in the city area," he says.

– Alan Harman

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honey by comparison in August 2008 was valued at $1.29/lb.

Indonesia

White Honey imports up through August 2008 showed a 407% increase over the total amount imported in 12 months of 2007. All the imported Indonesian honey was white or extra light amber in 2008. 2008 imports from Indonesia are projected to increase by nearly 200% over 2007 volumes and reach 7,569,000 lbs. for the year.

Malaysia

Total imports through August 2008 were 5,691,601 lbs., compared to 3,817,586 lbs. for 12 months of 2007. In 2007 and 2008 white or ELA colors comprised 100% and 80% of imports, respectively. This is unusual for a region that would be expected to produce primarily darker honeys. In 2007, 91% of Malaysia's honey exports were made to U.S. destinations, and the total volume of Malaysia's exports increased 900% over that of 2006.

Thailand

White honey imports reached 1,262,100 pounds through August 2008, almost 10 times the volume of Thailand white honey which entered during 12 months in 2007. Honey imports from Thailand in 2007 were 85% Light Amber in color.

Packers report having received over the past year many samples from new importers who offer honey in large quantities from new sources. Those samples have flavor profiles that are like Chinese honey. Pollen analyses have shown that most of the pollen has been filtered out of the honey, but the pollen that remains suggests Chinese origin.

The two-tiered market is crushing to both the packers and importers, no less the beekeepers, who try their best to conduct business with integrity and responsibility. The price gaps are so huge that the unfair price advantages are devastating. How much of the surge of under-valued imported honey remains as carry-over and where it is will influence current tendencies.

Our country does not produce enough honey to meet its demands. So we need imported honey to supplement our national production. But the honey should enter the marketplace fairly so that all can compete on a level playing field governed by law and business ethics.

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President-elect Obama's farm platform, section 26-b-3, reads, "The honeybee being the undisputed cornerstone of American agriculture, funds sufficient shall be allocated to the search for the cause(s) of, and remedies for, honey bee Colony Collapse Disorder (CCD)."

Wow! How come you never read this in *Bee Culture*, or that other bee periodical?

OK, I made it up, but it has a nice ring, doesn't it? And I guarantee you, Mr. Obama and Mr. Biden have heard of CCD. Everybody has. It's just not on their radar at the same level as say, health care, or Iraq, or General Motors.

One thing I liked about Sarah Palin was that she comes from a commercial fishing family. That's pretty real. I used to own and fish a commercial salmon hand troller out of Sitka, Alaska. The sense in the fleet then was that outside of the fishing community, no one in America had any real idea how commercial fishing worked or what the problems and frustrations were. People in the Lower 48 thought commercial fishing was about nets with baby seals tangled in them, and endangered species. At least that's what I assumed.

Well, we almost had a commercial fisherwoman a heartbeat from the presidency! Someone who might actually have an informed opinion about the International Halibut Commission, who knows the difference between silvers and kings, gillnetters and set netters. You betcha. Although when a reporter asked Governor Palin what her favorite Alaskan dish was, she reportedly said, "moose." I can't believe she said that.

Can you imagine a beekeeper in the White House, like Ukranian President Victor Yushchenko? Honey on the White House table at every meal? A real commitment to CCD research? Dare to dream, my friends.

I went in today for my second of three rooster comb injections. "Rooster comb injections" sounds a little out there, I know, but it's not even alternative medicine. It's Plan B when knee cartilage surgery leaves you still feeling gimpy.

"Think of it as 50-weight oil," the doc said, as he pushed a reluctant drop off the end of the needle.

It's too soon to know if this will help my knee, but my virgin laying hens have become quite affectionate of late, the little darlings.

A few weeks ago I gave a little hex jar of honey to Judy the doc's nurse, because she's been so helpful, and also because I know how to lay down a little 50-weight oil where it counts. To turn the sometimes stubborn gears of the medical bureaucracy, you need a friend on the inside.

I got her hooked. When I saw Judy a week ago, she said she wanted to buy a quart. She wasn't working today, so I left the honey with the receptionist, who held it up to the light. "It's for Judy," I said.

By the time the doc came in to give administer my injection, the story had already gotten twisted. "Thanks for the honey," he said.

"It's for Judy," I said.

"Oh," he said.

It takes awhile to inject the gear lube. I had ample time to answer the doctor's questions about CCD.

"Nobody knows," I summarized, "but it's not your cell phone."

"I'll never have one of those," he said.

I almost had a date with a girl to see *The Secret Life of Bees*, but I went anyway. I got the senior discount on admission but not on the popcorn. There were three other people in the theater – all women. I liked the movie – I'd already read the book – but it's basically a chick flick, with lots of crying and strong women and mean men in it. Actress Dakota Fanning is cute beyond cute as teen runaway Lily Owens looking for a family to love her, and imposing August Boatwright (Queen Latifah) plays a charming, if unlikely, commercial beekeeper and cult leader.

Lily and August look a bit tentative handling frames of honey bees, but they do it, by golly, so let's give credit where it's due.

I wouldn't recommend *The Secret Life of Bees* as a how-to movie, but nothing significant about bees in the film seemed out and out wrong. Maybe it wasn't the way I would have done it, but it wasn't wrong.

August's honey labels featured an arty black Madonna gazing down at the baby Jesus, and it made me reflect that labels do indeed sell honey.

I used to put on my own custom labels. A friend found the nicest honeybee design on the Internet, and I got the local print shop to put it on a label for me. But now the label price is up to 45 cents apiece, and I decided that's too much.

So I sell a lot of honey without any label. I know you're not supposed to. But I peddle most of my honey in quart jars, to people I know. No label seemed to not be an issue.

Then I made a discovery. When I sold at Potato Day in Carbondale this year, I started off selling quarts with no label and smaller containers with inexpensive labels I ordered out of a bee supply catalog. These labels were nothing special. But a lot of my quart customers asked if they could have a label. I'd hand them one, and they'd put it on themselves!

So as soon as Obama fixes the economy, I'll spare no money on labels. I'll raise my prices, and sell more honey than ever. Everything will be peaches again. It will, won't it?

Ed Colby

50-Weight Oil

BOTTOM BOARD