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Bee Culture

October Features . . .

Page 51

Page 91

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Lots of time to make gift baskets this year. See Ann's article on page 85.

Basket assembled by Sandra Fitz, Root Candles and photo by Kim Flottum.

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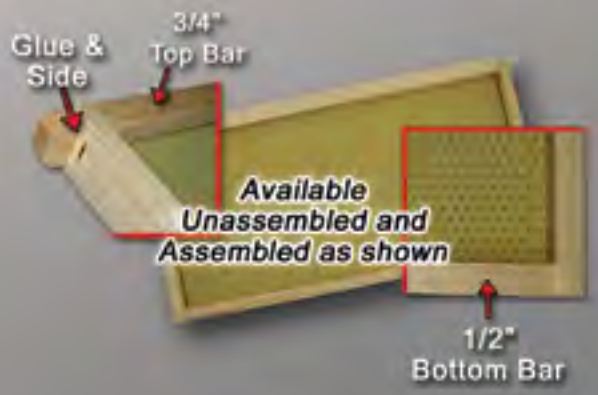

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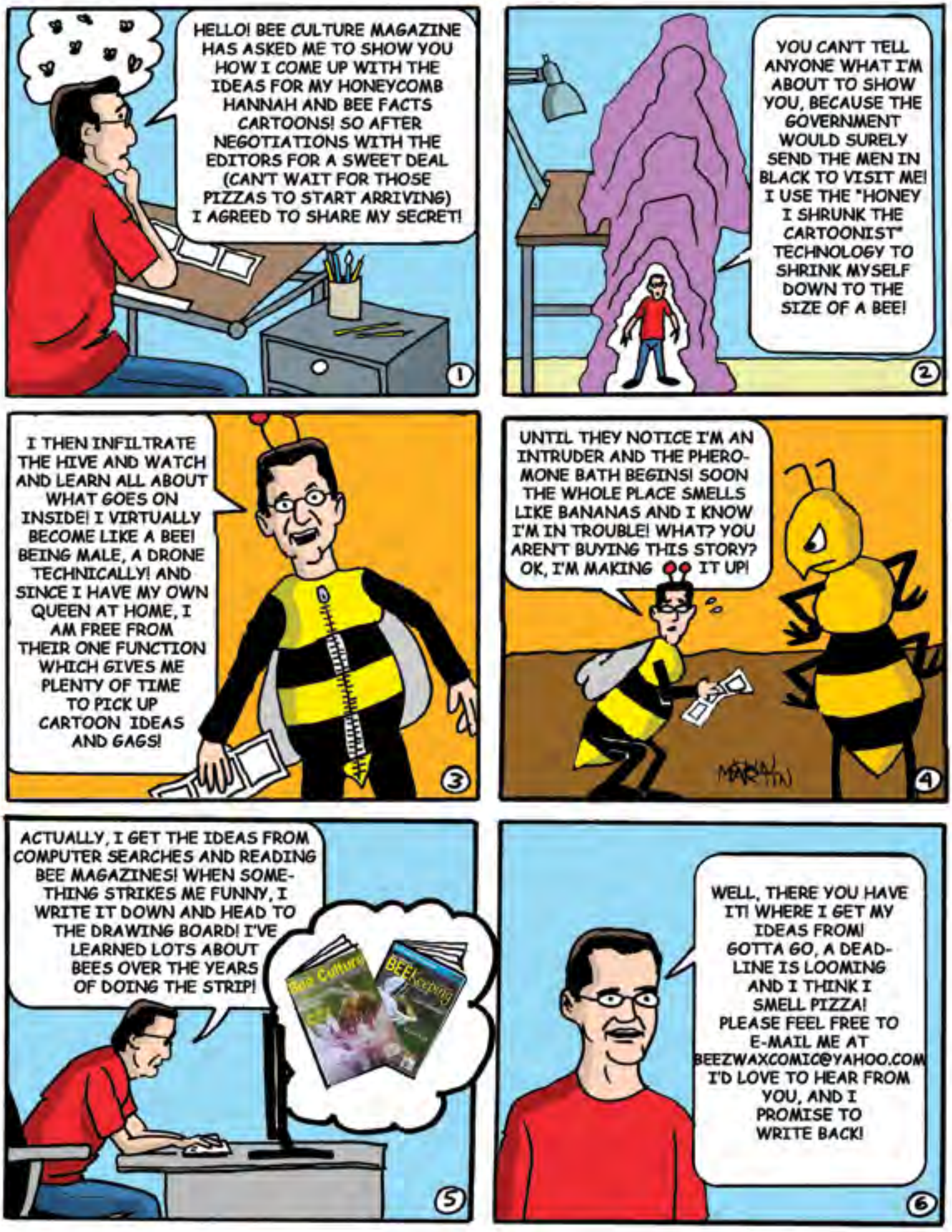
Page 75

In Every Month –


HELLO! BEE CULTURE MAGAZINE HAS ASKED ME TO SHOW YOU HOW I COME UP WITH THE IDEAS FOR MY HONEYCOMB HANNAH AND BEE FACTS CARTOONS! SO AFTER NEGOTIATIONS WITH THE EDITORS FOR A SWEET DEAL (CAN'T WAIT FOR THOSE PIZZAS TO START ARRIVING) I AGREED TO SHARE MY SECRET!
1
YOU CAN'T TELL ANYONE WHAT I'M ABOUT TO SHOW YOU, BECAUSE THE GOVERNMENT WOULD SURELY SEND THE MEN IN BLACK TO VISIT ME! I USE THE "HONEY I SHRUNK THE CARTOONIST" TECHNOLOGY TO SHRINK MYSELF DOWN TO THE SIZE OF A BEE!
2
I THEN INFILTRATE THE HIVE AND WATCH AND LEARN ALL ABOUT WHAT GOES ON INSIDE! I VIRTUALLY BECOME LIKE A BEE! BEING MALE, A DRONE TECHNICALLY! AND SINCE I HAVE MY OWN QUEEN AT HOME, I AM FREE FROM THEIR ONE FUNCTION WHICH GIVES ME PLENTY OF TIME TO PICK UP CARTOON IDEAS AND GAGS!
3
UNTIL THEY NOTICE I'M AN INTRUDER AND THE PHERO-MONE BATH BEGINS! SOON THE WHOLE PLACE SMELLS LIKE BANANAS AND I KNOW I'M IN TROUBLE! WHAT? YOU AREN'T BUYING THIS STORY? OK, I'M MAKING IT UP!
4
ACTUALLY, I GET THE IDEAS FROM COMPUTER SEARCHES AND READING BEE MAGAZINES! WHEN SOME-THING STRIKES ME FUNNY, I WRITE IT DOWN AND HEAD TO THE DRAWING BOARD! I'VE LEARNED LOTS ABOUT BEES OVER THE YEARS OF DOING THE STRIP!
Bee Culture
BEEkeeping
5
WELL, THERE YOU HAVE IT! WHERE I GET MY IDEAS FROM! GOTTA GO, A DEAD-LINE IS LOOMING AND I THINK I SMELL PIZZA! PLEASE FEEL FREE TO E-MAIL ME AT BEEZWAXCOMIC@YAHOO.COM I'D LOVE TO HEAR FROM YOU, AND I PROMISE TO WRITE BACK!
6

In Dispute

I read Jessica Louque and Randy Fuller's responses to Ivan Rickers' letter (*BC*. Sept 2018) with increasing unease.

In the first paragraph Jessica writes, ". . . I can say with a lot of confidence that I highly doubt there are many people in the U.S. that have more experience than I do with beekeeping. I can only think of one person that might have worked in colonies more than me and she is in Germany."

Such a generic, unproven, unscientific allegation, besides confusing quantity with quality, disparages other contributors to the magazine such as Jay Evans, Jennifer Berry, Ross Conrad, Ann Hartman and Jim Tew, and made it problematic to consider seriously what followed.

In the penultimate paragraph of his response, Randy Fuller sets out to 'set the record straight' re glyphosate, in particular that it is ". . . not a neurotoxin. There is insufficient evidence to rule this molecule carcinogenic . . . Glyphosate is one of those rare materials that comes along and changes the world for the better."

Putting aside the blanket (and I would say disputable) claim of the last sentence, it is ironic that on August 10 of this year a jury in California awarded a school groundskeeper $289 million on the grounds that glyphosate is carcinogenic and that exposure over three years was the cause of his terminal lymphona.

The prosecution successfully argued that internal communications revealed that Monsanto (now Bayer) had known for decades that Roundup is carcinogenic but didn't disclose it for fear of disrupting its multi-billion dollar global business. More than 2.6 billion pounds of the chemical were spread on U.S. farmlands and yards between 1992 and 2012, according to the U.S. Geological Survey. Monsanto earns $1.9 billion a year from Roundup and $10.2 billion from "seeds and genomics," most of that category being Roundup-ready seeds.

The case followed a 2015 classification by the WHO's International Agency for Research on Cancer as 'a probable human carcinogen,' and Bayer, which is facing more than 300 similar such suits, is of course going to appeal the decision.

While this decision was announced after Mr. Fuller had written his response, he chose not to mention the WHO decision, which seems disingenuous. In a judicial setting, considering both sides of the question, the jury decided in favor of the prosecution.

I don't want to believe that there is a hidden agenda behind Jessica's Bigger Picture series, but these two articles have not allayed my concerns.

Jeremy Barnes
Seven Valleys, PA

Where?

Can I gently suggest a piece on "successful editing" wherein somewhere it would be mentioned just where this beekeeper is located?

Of course, since I'm approaching an age where I can hide my own Easter eggs, that information might be hiding in plain sight and I missed it.

Nice issue – pleased to see oxalic acid vapor treatment is still highly regarded.

Curtis Crowell

Editor's Note: *Curtis is referring to the article in the September issue on page 87. The writer, Bill Ruzicka, of course, lives in Canada where Winter is almost a full time occupation. We apologize for that error of omission.*

Theft

New Zealand beekeepers who had 64 of their hives – worth NZ$50,000 (US$33,430) – stolen, literally fought back and recovered all but four of them.

The *New Zealand Herald* reports when Kieran Wood of Settlers Honey went to the location of his sites outside Wanganui, 120 miles north of Wellington, he found it had been stripped.

Settlers Honey manager Bryn Hudson notified police.

Then Hudson and his workers decided to some detective work.

They began talking to contacts about who the offenders may have been, and they came up with some places of interest. They found a tire tread pattern at the site that did not match their vehicles.

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Their investigations led to a vehicle whose tire tread as well as a trailer that had recently been used to shift bees.

"We found out about a property – and sure enough we've gone there, and we've seen a bunch of blokes in bee suits going through our beehives." Hudson tells the newspaper.

Police were notified, and Hudson and his workmates approached the people working on the hives.

They were met with aggression.

"There was a bit of a skirmish when we first arrived at the property," Hudson says.

One man picked up a tree branch and started swinging.

"He caught a couple of the boys across the back and then he had a go at one of our utes (pickups). He cracked the windscreen and damaged one of the side panels."

But the Settlers Honey posse came out on top.

Nathan David Churton was convicted in Whanganui District Court with receiving property and was sentenced to 170 hours of community work, six months' community detention and ordered to pay NZ$4.600 (US$3,076) in reparation.

Hudson says he was lucky to get them back, he said, because after hives are stolen there is generally only a 24-hour window of opportunity to salvage them before the evidence is destroyed.

"We were able to load them back into our vehicles the night we found them," he says. "It was a long night and we didn't have our bee

suits, so we had to load them up by hand which is a bit of fun. The bees were in a pretty bad way, they took a bit of strengthening up, but we were stoked just to get them back."

The newspaper reports Settlers Honey has installed cameras at their sites and placed GPS trackers in their hives.

Submitted by Alan Harman

Good Food Awards

On Friday, August 3, Entry Period for the 2019 Good Food Awards came to a close. From smoked octopus from Alaska to beet nut butter from New York, **our judges** have their work cut out for them tasting over 2,000 submissions from all 50 states, Washington, D.C. and Puerto Rico.

We look forward to introducing the 300 judges to the landscape of tasty, authentic and responsible food that is thriving from coast to coast. This year's roster includes Michelin starred chef Mourad Lahlou; Consul General of Italy in San Francisco Lorenzo Ortona; Salt & Straw founder Tyler Malek; "Guerrilla Gardener" Ron Finley; and Joyce & Pascal Attar, the brother and sister, second generation team behind World Foods Portland. To learn which judges will be evaluating each category, visit the **Awards category pages** and scroll to the bottom.

All entrants received shipping information and labels from the Good Food Foundation this week. If you entered and did not receive shipping information, please double check your spam filter and then give us a call here at 415.447.3268.

Good Food Awards Committee

Conflict Of Interest

I appreciated Mr. Rickers suggestion that Jessica Louque, in her May pesticide article, had a conflict of interest. Mrs. Loque's rambling response seemed to be that "Conflicts of Interest" are nothing more than conspiracy theories. "I have a conflict of interest" should begin any article submitted by anyone who receives compensation from an entity that supports the entity's position. There is a lot, a really lot, of money on the side of the issue – pesticides are good. Money for the – pesticides are bad – side of the issue is left to future economic and health consequences.

Ronald Moore

Sulfoxaflor

I would be grateful if you would mention the law suit that Polinator Stewardship Council was involved in to get the EPA to follow their own risk assessment rules on the registration of Sulfoxaflor.

With Earth Justice as our counsel the judge ruled in our favor and ordered the EPA remove Sulfoxaflor from the market some time ago.

Unfortunately EPA section 18 (emergency registration) Sulfoxaflor back into the market, a process that I to this day believe was contemptuous of the court order.

Regretfully the Pollinator Stewardship Council did not have the means to challenge and so the killing continues.

The Pollinator Stewardship Council needs support to be an effective organization. To learn more about them or to make a donation visit www.pollinatorstewardship.org.

Bret Adee

Fake Honey & Interpol

In Apimondia's most recent Newsletter we cover many issues, including events across the world that have caused great losses because of climate change.

Forest fires and floods have destroyed people's homes and unfortunately there has been loss of life also. So we need to be conscious of this when we talk about the loss of our honey bees. But many Commercial and hobby beekeepers have lost all of their bees and, of course, this will not only impact on them but also on the quantity of honey available on the world market.

This brings me to a very interesting meeting I attended in Amman, Jordan 24-26 July. This was a workshop meeting organized by Interpol, the World Police Organisation, on 'Food Fraud'. Many of the delegates presented papers on food fraud in their respective areas including Olive Oil, Coca Cola, Cheese, Beef, Wine and many more that are being produced in awful conditions by organized CRIME GANGS across the world.

From the papers presented it's fair to say that China appears to be leading the way but countries such as Ukraine, Poland, Italy, Spain and Portugal along with Indonesia, Vietnam, Thailand and India are exporting products that statistics don't support these countries as having produced or available.

Of course, HONEY is another product that is being produced in vast quantities but when we research into this we find that there are not enough bees to produce what is being exported by some countries.

Interpol has now taken this on as a priority and are now examining the research and statistics available and over the coming months will be reporting on their activities.

We hope to cover this in more depth at our coming meeting in Canada. We hope to see all of your readers there.

Phillip Macabe
APIMONDIA PRESIDENT

An Editorial –
The People's Department

An early hallmark of the Trump Administration's management of American farm policy is its uncanny ability to pick fights that are as costly to win as they are to lose.

For example, even if the President's import tariff plans succeed, how many ag exports will American farmers lose before the White House declares victory and moves on?

So far, in the short run, the cost is $12 billion in taxpayer money the White House already has ticketed to soften the tariffs' impact on American ag. In the long run, tens of billions more.

Determining how costly – or even if the trade policy is good, bad or indifferent – is exactly what the U.S. Department of Agriculture's (USDA) Economic Research Service (ERS) is designed to do.

Right now, however, the ERS is struggling to regain its footing after an out-of-the-blue announcement by Secretary of Agriculture Sonny Perdue August 9 to "relocate" it and the National Institute of Food and Agriculture (NIFA) from Washington, D.C. to unknown "new homes" somewhere in the U.S.

Perdue's announcement was a gut punch to staffers at NIFA and ERS, two of the most apolitical, number-focused agencies in the federal bureaucracy. Officially, he explained, moving both out of Washington, DC, one of the nation's costliest places to live, would allow USDA to better "attract and retain" qualified people.

He also noted that the move would save taxpayers money – presumably because USDA could pay the then more-rural workers less than today's big city counterparts – and "place these important USDA resources closer to many of (sic) stakeholders."

Few at ERS believe the claims and Perdue offered no cost/benefit analysis to support any of his assertions.

In fact, the opposite seems more likely. *Politico* recently reported that ERS and NIFA employees were given "assurances" all would earn the "same base pay they were earning while in Washington" no matter where Perdue's mandated exodus takes them.

Facts, however, seem not to matter to Perdue; he wants the agencies out of town by next year and he's moving fast to make it happen.

On Aug. 9, the Federal Register posted a "notice" that the "Office of the Secretary, USDA" is "exploring potential sites for a proposed new headquarters" for both ERS and NIFA. The notice alerted "Interested parties wishing to make an Expression of Interest" to "do so in writing by September 14, 2018."

Why the bum's rush to move the world's largest group of ag economists and ag policy analysts from the world's capital for ag policy and ag economics?

Payback, explained the website *The New Food Economy* Aug. 20. Fact-based analyses by ERS, it noted, "has undercut [President] Trump's claims about food stamps, farming, and the environment." As such, ". . . it's about to get booted from Capitol Hill."

Others see Perdue having a more calculated, darker motive.

"I think the real truth," one seasoned Capitol Hill watcher noted in an Aug. 20 email, "may be that both Perdue and Mulvaney" (John "Mick" Mulvaney, the White House Director of the Office of Management and Budget) "were (angry) that Congress did not go along with their proposed huge cuts to ERS" earlier this year and saw "this as a way to accomplish the same objective without having to convince appropriators to cut spending . . ."

That explanation is more plausible than Perdue's. Supporting it is the fact that the Secretary made his move near the start of Congress's August break. That means the usual 30-day comment period to question actions such as his will be nearly over when Congress returns after Labor Day.

That does not mean, however, the 47 House and Senate members now serving on the 2018 Farm Bill conference committee don't have the time to question the Secretary's ill-defined, costly attempt to deport key USDA agencies from the ag policy arena.

In fact, Congress should hold off any Farm Bill vote while its members help farmers and ranchers learn what they and the nation are getting – and losing – with Perdue's many "reorganization" moves at USDA.

After all, it is, as Abraham Lincoln noted on its founding, The People's Department.

Alan Guebert
Reprinted with permission of the author

***Editor's Comment**: Do you have any idea how important the ERS is to the beekeeping industry? We use their reports every month when composing the Monthly Honey Report. Coupled with NASS they are the only stable source of information on the progress, or not, of our industry. They have recently upgraded and increased the number of reports they have about use each year, so we have even better pictures of the pollination business, bee hive and beekeeper numbers, amount produced and where produced and the price of both domestic and imported honey, and if you add in the Census Bureau, we are able to calculate the annual per capita consumption of honey in this country. There is no other source of this kind of information. Period.*

That the Department of Agriculture aims to squash ERS is simply criminal. And to add insult to injury, they've denied a pay raise to civilian employees this year to pay for a tax break that hasn't done anybody you know any good. That ERS produces information for others in the food business isn't surprising, but when the facts they produce conflict with the claims of those in charge, there's hell to pay. And when even the congress agrees with the agency instead of those in charge, it is, unfortunately, the agency that will pay the price. Move, or else.

The timing of the announcement was key of course, since the farm bill is about ready to be passed. It will be late September when you read this, but if there is still indecision on this order, contact everybody you can think of to stop this insane order. ERS is about all we have when it comes to who we are, and destroying that agency will do nothing good for bees and beekeepers.

Kim Flottum, Editor

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  - o Three monthly webinars per month, for a total of nine webinars between Nov 1st 2018 and Jan 31st 2019. These fascinating and fun presentations are a great way to learn about beekeeping and include time for Q&A.
  - o Access to the Colony members-only beekeeping Facebook group. Join others, of all levels of experience including other new beekeepers, to engage, ask your questions and make friends!
  - o Our beyond-the-basics Colony Beekeeping eMail Newsletter
  - o Discounts at the PerfectBee Store, to save money on your beekeeping purchases
- **Colony Membership + Kick Start**.

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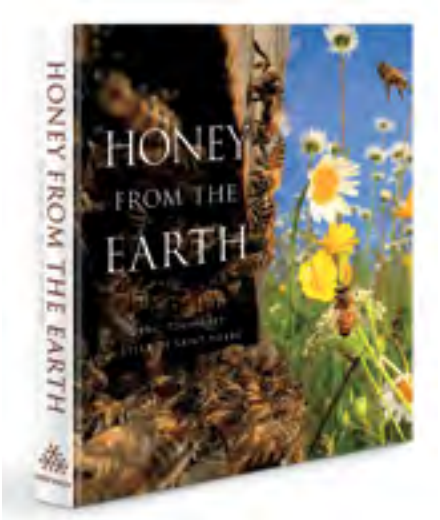
Please meet Eric Tourneret, the internationally acclaimed honey bee photographer who spent *15 years* traveling the world to capture the breathtaking diversity of bees and beekeeping traditions on every continent. His quest culminated in the publication of *Honey From The Earth: Beekeeping and Honey Hunting on Six Continents* – the most stunning collection of bee photography ever produced, complete with insightful commentary from a dozen of leading bee experts, including Dr. Tom Seeley, Dr. Jurgen Tautz, Kirk Webster, and many others.

Shot in 23 countries, *Honey From the Earth* presents the beauty and sweetness of our planet in all its glory, and it is also a powerful plea to protect and restore Mother Earth.

Here is a hunter hanging on a rope ladder off a 200-ft cliff in Nepal, harvesting honey from the giant Asian bees, wearing no protection. Then there are the truckloads of hives of commercial beekeepers in America. You discover the artisan straw skeps in Germany, the unique honeypot ants of the Australian desert, and hives made inside living trees in Russia. You read the honey myths from the heart of the African jungle, and witness moving bees by boat in Argentina. See the Chinese peasants pollinating their vast orchards by hand because pesticides killed all bees in their region. Visit rooftop apiaries in Hong Kong and upscale honey shops in Turkey's Istanbul. Meet our familiar honey bees and discover the most exotic stingless bees of the tropics – and on, and on.

The imagery of *Honey From the Earth* is not just masterful photography produced by an inspired artist. Exploring these pictures, I can sense that *I* was there to witness what Eric Tourneret witnessed, and to experience what these beekeepers, honey hunters, and even *bees* experienced as part of their life journey. Call it *imagination*, but that's what makes this book so meaningful to me. And now when I go back to *my* bees and sit by a hive's entrance watching their play, I am more keenly aware of the thousands of people in every corner of the world who – this very moment – have feelings similar to mine as they watch *their* bees. There's this deep sense of belonging to the brotherhood of people I've never met, and – together with bees and all critters large and small – belonging to the fragile web of life on a warm and welcoming planet hurling through the vast expanse of the night sky. This contemplation sometimes brings a ball of tears up my throat.

Considering a new book for publication, I always ask myself a question: "Will it be relevant 100 years from now?" In the case of *Honey From the Earth*, the answer is a big *YES*. In fact, I believe that as time goes by, this book will become even *more* potent than today, and not only because the ecosystems and practices shown here might go extinct. I wonder if people in the future would be able to relate to what *Honey From the Earth* represents. If it was not for honey, I would not be



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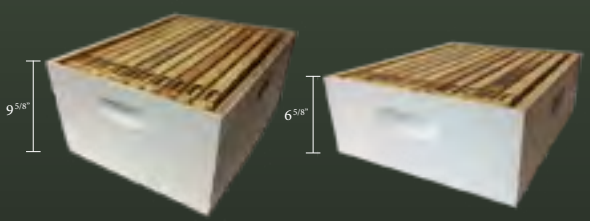

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Get your copy of *Honey From The Earth* for only $55 (that's $10 off the regular price) until November 30, 2018. Visually stunning, large-format hardcover, 352 full-color pages. Order online at **www.HorizontalHive.com** or send a check for $59 (this includes shipping) to: Deep Snow Press, HC 73 Box 470, Drury, MO 65638. Price after December 1, 2018: $69.

The Ethics of Beekeeping, by John Whitaker. ISBN 978-191227-1245. Published by Northern Bee Books, UK. 9.5" x 6.5". 116 pgs., color throughout. Soft cover. $20 on Amazon or from the publisher, **www.Northernbeebooks.co.uk**

This is a book of questions. Not answers, not decisions, not resolutions. It is about animal rights, such as housing, and where we choose to keep bees, and where bees choose to live, and they are not always the same. And do you even own those bees? Really. And what about natural beekeeping, and movable frames, and non-interference, and treating for pests and such, or not. What is the right choice?

And of course there's the simple act of removing frames to inspect. A few bees die every time, well almost every time, a hive is examined. Is the act of examining a hive to insure it is healthy the greater good over the death and injury, the perhaps unnecessary death and injury of several bees of value?

Taking honey and feeding sugar. Certainly that has an ethical consideration, as does treating, or not those pests and predators found when making that hive inspection. And even just feeding when no food is available in the landscape. What's the right choice? Select for bees that don't die, by letting others die?

And what about other beekeepers? And their bees, and your diseases?

And then there's the whole other world of what do you do with your honey? Blend, adulterate? Water down? The questions are many, and the author offers no respite. You have to do that yourself.

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INNER COVER

Soybeans, And Honey.

Jay Evans talks about honey bees and soybeans in his article this month, and when he did some historical research, he came across work I was involved in a long time ago with those two subjects – soybeans and honey bees.

I'd worked my way through undergraduate school in Horticulture, Production and Technology (I wanted to run a greenhouse business back then) and was pretty good at it because I got to practice all Summer long working for UW's Extension Entomologist for small fruit, large fruit, turf, ornamentals and greenhouse pest control. Chuck Kovel was the go to guy for any grower of any of those crops when they had a bug problem they couldn't figure out. So I worked in apple orchards, cranberry bogs, golf courses, nurseries, raspberry and blackberry farms, blueberry plantings and greenhouses. Back then I could kill any bad bug in any of those places eight different ways. But to learn how to kill them, we had to grow them, and we did that on one of the Experimental farms the University had, where there were chickens, pigs, corn, beef and milk cows, greenhouses and bees. So I got to work outside all Summer growing and killing things, and inside a greenhouse all winter, growing and killing things. What a job!

The USDA had a Bee Lab in Madison back then to study northern beekeeping among other things. Wintering was one of the tasks there, along with managing for honey production, but so was pollination of crops growing in the north. Eric Erickson was the research leader then, and because we worked on the same farm as his crew did, I was familiar with both him, his scientists and his support staff – the actual beekeepers there.

When I graduated my job with the Extension Office was over and it was time to actually use those skills I'd learned earning a living. At exactly that same moment, Eric got a four year USDA grant to study soybean pollination and production. He got a post-doc to do the science, but he needed someone who could manage all the varieties and types of soybeans he would need for the study. He needed a horticulturist, and I needed a job. A marriage made in Madison. Neither of us had to look one bit to solve both of our problems.

Eric's grant was looking at what made soybeans attractive to honey bees. There was the obvious traits noted by Jay in that some soybean flowers, a legume with a pea-like flower, never opened and were totally self-fertile. But some varieties had flowers that opened wide open. Of those, some would be visited by bees, while some never saw bee one. He wanted to know why some, while open, were not attractive to bees. So we had to grow smallish plots of every kind of soybean he could find, and then measure honey bee visitation. Why some, and not others was the question, but first – which were the most attractive.

So before dawn, until much later in the day, all during bloom, I was in those plots counting honey bees, trying to determine those that were attractive compared to those that weren't. This took most of the first summer outside, and winter inside in the greenhouse. But after that, we had a pretty good idea, and it was time for the next step: What made them attractive, and, was there something soybean farmers could do to increase attractiveness. Others in the lab, and other scientists had shown that soybeans visited by honey bees had an increase in yield. Some significantly.

So, next we moved into a special building called the Biotron on the Madison campus, where we could control every environmental condition needed to grow plants except gravity, and I hear they finally got that figured out. We determined air temperature, every aspect of the nutrients the plant needed, the quantity and quality of the light they received, the photo period, humidity, soil temperature, water quality and watering frequency. So we controlled each of those conditions for a group of plants, then, when they bloomed, offered some of each to a small hive of bees to see which they preferred.

From this we picked the most attractive and measured which of those conditions we controlled seemed to have the greatest affect (high, medium or low nitrogen amounts in the soil for instance), and reproduced as close as possible those conditions outside. The results weren't a surprise. Pick a prolific variety, grow them in conditions that promoted even more productivity including bees, and yields go up. A no brainer. But soybean farmers didn't seem to pick up on the results, and the study, though published, kind of went the way of lots of good information.

But we did find out something interesting. When you look at a large soybean field you see a sea of green. Uniform, continuous, and a non-event from the perspective of a honey bee flying over. What we found out was, if a field had a landmark, a telephone post for instance, you would see more bees closer to the post than farther from the post. There's no doubt bees visit soybeans with or without a landmark. Mostly working the field edges, and beekeepers harvest barrels of soy honey every summer. But, and this was the fun part, we put a chair about 50 yards from the edge of a 50 or so acre field and measured yield of all the plants

within 20 yards of the chair at the end of the season. Sure enough, the further from the chair, the less the yield.

Two lessons here, for soybean farmers. Pick the best variety for attracting honey bees and your yield will increase, and put a landmark every now and then across the field. Something simple, like a stake bees can see, but won't get in the way at harvest, and your yields will go up even more. What could be easier?

•

Just in case you haven't noticed, we've ramped up our digital presence quite a bit recently. We've had the KIM&JIM show (a monthly webinar with myself and Jim Tew interviewing a guest) for quite a bit already, but it continues to draw thousands of visits each month with people watching the webinars live, and then revisiting those that have been archived. You can find those on our web page. Also there is every CATCH THE BUZZ we've done – over a thousand bits of news that informs and educates beekeepers. Sign up for it, it's free, and you get a piece of beekeeping news or information in your inbox every day, well almost every day when the digital gods don't wake up on the wrong side of the bed. Except Sundays of course. We all need a day off. And then there's the web page itself, with hundreds of past *Bee Culture* articles available, at the click of a mouse. You don't have to find that issue from a year ago February somewhere in the honey house or in a pile somewhere, just pull up that issue, sit back and remember what it was you wanted to find.

And now our podcast is available. We just started it in June and over 6000 downloads have been made already. Once a week or so we, that is Jeff Ott and I, get ahold of somebody in the beekeeping world and have a chat. Informal, easy and always both entertaining and informative. You can find that at **www.beekeepingtodaypodcast.com**. And that too, is free. You can bring it up on your phone and listen while heading to the beeyard, or the next meeting. Take a look, we've talked to some pretty interesting folks so far, and have a lot more lined up.

•

There's a new type of crop insurance out, and we've actually done two articles on it and how it works. It doesn't have to do with past production or any other records, it has to do with the amount of rain that fell on your colonies this past Summer during a certain couple of months that you choose. That's it. Rain. Not enough, you're covered. Simple. And you can choose the level of coverage you want, or can afford. Some, or lots.

But, what if it rains too much? What if it rains and rains and rains. What if it drowns your honey crop. Washes it away. Floods and storms and all the nectar washed away. That's what happened to our goldenrod crop this year. Rain and rain and rain and rain. The earlier part of the season, however, seemed to do OK, and there was honey in those boxes. But think about it – too little rain can ruin a crop, but so can too much, or even the right amount at the wrong time.

Just like too little rain for a certain two month period and you get paid, what about too much for a certain two month period? What if it rained nearly every day for the goldenrod flow, or the white sweet clover flow, or the tupelo flow? Too much rain, or rain too often and you'd get paid. Such a deal! Somebody look into that, OK? Honey crop insurance should be honey crop insurance.

•

One of the people we are trying to get on our podcast is Eric Wenger, the Chairman of True Source Honey. For background, I've copied the following off their web page – **www.truesourcehoney.com**.

True Source Honey, LLC is an effort by a number of honey companies and honey industry participants to call attention to the problem of illegally sourced honey; to encourage action to protect consumers and customers from these practices; and to highlight and support legal, transparent and ethical sourcing. The initiative seeks to help maintain the reputation of honey as a high-quality, highly valued food and further sustain the U.S. honey sector.

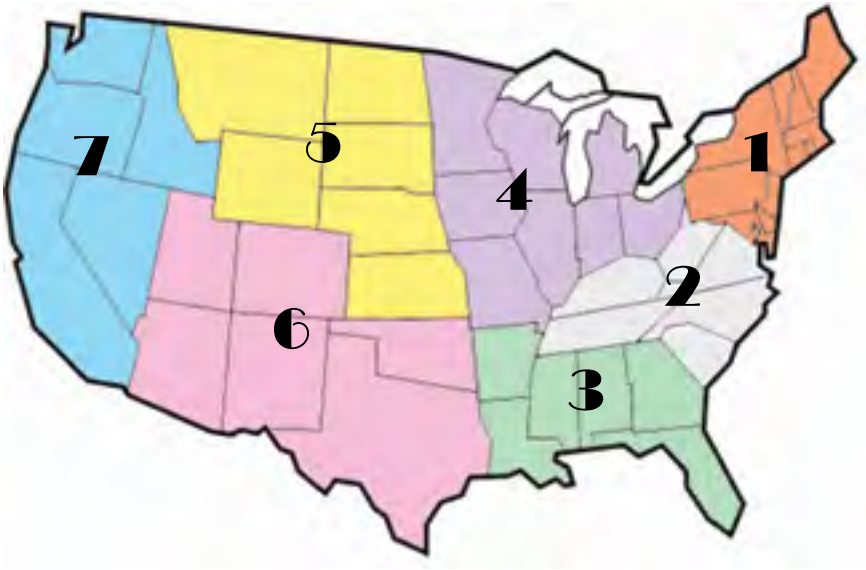
Eric and I were on a national public radio show last March called 1A, a talk show looking at current trends, politics and such, and with us was Gene Brandi, past President of the American Beekeeping Federation, and Margarita Lopez-Uribe, Assistant Professor of entomology at Penn State. The host was interested in both the quality, quantity and the price of honey and the status of honey bee health. The show is live, but is archived at **https://the1a.org/shows/2018-03-27/pollinator-judgement-day**. Gene talked about the stresses bees are under and what's being done, Eric talked about honey coming in that was cheap, but mislabeled as to source, and I talked about local honey, increases in beekeepers in the U.S., and chimed in with the others when I could.

I was impressed with the story Mr. Wenger told about how far his company will go to insure that a bottle of honey that says Argentina actually comes from Argentina. They will send people to the shipper and follow the trail all the way to the beekeeper they bought it from. If there aren't enough bees, that honey probably didn't come from that beekeeper, and the sender is in trouble.

I mention this because now Interpol, the global police force, **https://www.interpol.int/About-INTERPOL/Overview**, is interested in the same thing. Funny honey coming from one place, but labeled as coming from somewhere completely different. Honey coming in from off shore at less than a buck a pound in the barrel has taken just about 80% or the market for honey in the this country. 80%!

I don't know if True Source or even Interpol can help stop this fraudulent practice, but at least someone is trying. Read the letter to the Editor from the President of Apimondia, and then take in the 1A show if you can. At the same time they are depressing, and enlightening. There may be light at the end of the tunnel, yet.

OCTOBER – REGIONAL HONEY PRICE REPORT



What's Your Market Doing?

With the off shore assault on the industrial U.S. honey market filling pipelines with low cost product, coupled with spotty production in the major producing regions, honey prices are changing. Wholesale prices are down a tad from last month and the month before, but retail prices, especially at the local level are rock steady to increasing a tad. With the new season just getting under way, we asked our reporters about their prices, if they were changing anything in their operations, and how colony conditions were looking for late Summer.

Fully 77% won't be changing prices this year compared to last, but the remaining 33% will be increasing. None will be lowering prices, which is a good sign. When it comes to increasing other income producing opportunities, 23% are going to ramp up queens-for-sale production, capitalizing on the local queen demand, plus selling local hives and nucs. And just under 15% are going to increase prices and production next year to capture more of that local market, but fully 63% are going to stay right where they are with no changes in sight.

As far as colony management is concerned, about 40% will be feeding carbs and protein this Fall, with about twice as many feeding carbs as protein, about 20% are going to need to combine weak colonies, and pretty much everybody is double checking to make sure everybody is healthy. Mite loads this Summer are pretty much under control, with 75% at or below average for what they expect in Summer, but about 20% had more than they wanted, way more.

Overall, colony losses this Summer, across all regions, is only about 6% so far, with a range of less than 1% in region 1, to a high of 16% in region 6. USDA reported losses in 2016 and 2017 for the July – Sept time frame were between 12 – 13%, so this year seems pretty good.

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.19	2.19	2.23	2.65	2.27	2.10	2.19	1.74-2.65	2.19	2.19	2.32	2.16
55 Gal. Drum, Ambr	2.05	2.16	2.08	2.53	2.05	1.97	2.05	1.35-2.65	2.10	2.10	2.16	2.09
60# Light (retail)	212.19	185.00	200.00	189.25	165.00	206.24	200.00	158.71-280.00	205.03	3.42	203.68	195.40
60# Amber (retail)	204.15	184.83	193.75	190.67	204.15	197.90	200.00	143.71-265.00	203.95	3.40	202.50	191.82
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	90.35	75.56	87.00	65.00	57.84	84.00	90.35	57.84-134.40	84.58	7.05	82.72	84.76
1# 24/case	129.95	107.15	121.53	100.60	127.16	146.88	128.40	84.20-192.00	121.81	5.08	122.26	126.27
2# 12/case	123.12	95.80	105.04	87.73	97.44	112.80	114.00	79.20-192.00	110.65	4.61	109.40	109.22
12.oz. Plas. 24/cs	100.98	97.71	84.98	82.50	74.40	109.20	97.20	37.90-172.80	96.62	5.37	96.80	94.03
5# 6/case	133.49	108.55	133.49	105.88	102.30	126.00	133.49	71.50-210.00	126.22	4.21	128.66	127.53
Quarts 12/case	157.75	144.36	128.84	144.60	155.32	178.78	144.00	109.20-222.00	149.90	4.16	153.51	153.10
Pints 12/case	96.67	92.67	75.80	96.00	111.00	81.58	84.00	65.00-140.00	90.85	5.05	93.27	96.02
RETAIL SHELF PRICES												
1/2#	5.54	4.37	4.80	3.75	4.24	5.00	7.00	3.25-9.00	4.95	9.91	4.77	4.96
12 oz. Plastic	6.86	5.09	6.16	4.32	4.72	7.25	5.60	3.50-12.00	5.97	7.96	5.81	5.80
1# Glass/Plastic	8.18	6.86	7.56	5.95	6.57	6.17	9.00	4.00-14.00	7.35	7.35	7.18	7.37
2# Glass/Plastic	13.19	11.11	12.19	9.13	13.57	10.00	14.50	7.00-21.00	12.37	6.19	12.17	12.40
Pint	9.88	9.30	8.28	10.00	8.80	10.73	10.47	4.00-16.00	9.76	6.51	10.02	10.17
Quart	18.29	16.45	14.92	13.83	15.90	18.79	17.77	8.00-32.00	16.57	5.52	17.32	17.31
5# Glass/Plastic	27.87	25.04	36.07	22.00	22.53	25.00	27.87	15.00-43.25	26.62	5.32	25.56	28.03
1# Cream	10.11	8.49	8.99	6.00	10.32	8.50	9.00	6.00-16.00	9.22	9.22	9.03	9.91
1# Cut Comb	13.47	9.25	9.99	10.83	12.50	10.50	14.50	6.99-24.00	11.44	11.44	10.75	11.59
Ross Round	8.99	6.71	8.99	9.00	8.99	10.63	12.49	6.35-12.49	8.55	11.41	9.14	10.36
Wholesale Wax (Lt)	6.89	5.05	4.86	5.00	6.00	4.50	8.50	3.00-12.00	6.29	-	7.06	6.21
Wholesale Wax (Dk)	6.41	4.60	3.80	5.00	6.41	3.25	6.41	2.55-12.00	5.55	-	6.25	5.56
Pollination Fee/Col.	93.38	75.83	67.00	95.00	80.00	90.00	93.38	45.00-160.00	84.25	-	84.29	80.00

It's Summers Time –

NC, EAS, Repairs and More

It's a busy, extremely hot month for Kim and I and when you sit down in your favorite chair to read this October issue, Summer will officially be over. The older I get the faster the time just flies by. My goal has become to just keep doing as much as I can, as well as I can, knowing all of the time that I won't ever be completely done.

In mid August we travelled to Charlotte where Kim spoke at the Cabarrus County Beekeepers Association. What a treat! It was an all-day Saturday meeting and Kim was the whole show. He gave four talks – wore him out, but we had a great time. These folks treated us like they'd known us forever. I feel like we've made some new friends for life. Mark Smith headed up the team and organized getting us there and taking very good care of us. He picked us up from the airport, drove us where we needed to be, showed us a bit of the area and got us safely back to the airport on Sunday morning. Thanks Mark.

Kim and Mark Smith getting ready for Cabarrus County meeting.

From Charlotte we headed straight to Norfolk, VA airport and then to Hampton, VA for the 2018 EAS Conference. Kim and I have been to a bunch of EAS meetings and this was by far one of the best. And from the numbers we've heard it was one of the biggest conferences ever. The best part of EAS is getting to see those dear friends that mostly you only get to see once a year.

A special treat this year – seven of our New Zealand friends were at EAS. These were the folks who treated us so special when we made that trip. That NZ trip will always rank near the top as far as adventures go for Kim and I. So it was extra special to get to spend a bit of time with them.

Michael Young.

Another of our International treasures was present this year – Michael Young from Northern Ireland. Michael is a chef, artist, meadmaker, beekeeper and so much more. We met Michael about 15 years ago and over the years have been able to spend time with him and his lovely wife, Rae and their family. It had been about three years since we'd seen him this time. Michael was a speaker this year and also a judge for the annual honey show.

Our advertising coordinator, Jean, attended her first EAS this year. She was able to connect with people she already deals with and to meet new advertisers and friends. If you had a chance to talk with her you realize how special she is to us here at *Bee Culture* and how well she does her job. Thanks Jean for taking time away from family to be gone from home for a week.

Kim and I were there for the entire week. Kim gave several talks and we sold books. We also did several Facebook live episodes. Some folks got cheated a little because of weak wifi signal. There are two things in life I can't control – Weather and Wifi!

Kim heading up a panel discussion at the end of the first day of Short Course at EAS 2018.

It was an extremely hot Summer here in northeast Ohio. We had over 20 days of 90 or hotter – Very unusal for us. The garden is doing okay, even though we were so late getting most of the stuff in. So, it's still nice and hot here and we're still getting lots of tomatoes, beans and squash. The bugs and worms got all of the broccoli. We tried growing tomatillos this year for the first time. Not sure what happened, but they didn't do well. The plant got huge, but the 'fruit' just didn't produce. Any suggestions?

Bees not doing so well either. I think we're down to three or four strong hives. In the last few days we're just

Our garden and deck, early September 2018.

Continued on Page 92

Bad Spouse Day

Peter **Sieling**

Did you ever have one of those days when she is just hairpin trigger sensitive? You can't just run off to the beeyard until the smoke clears. I have found it's better to work around the house, taking care of the little jobs that are on my list. I make sure she notices that I'm being helpful. Sometimes I pitch in and help with house cleaning. I sweep floors, and change burned out light bulbs, especially the hard-to-reach ones.

L.L. Langstroth's cottage.

I also like to read to my wife interesting and educational bits from articles and books that I think could help her improve herself. Old bee books, for example, frequently contain nuggets of homespun wisdom beyond the standard how-to-keep-bees information. I was reading a book by the inventor of the moveable frame hive, *Langstroth's Hive and the Honey-bee*, the 1878 edition, and shared a quote with Nancy as she kneaded bread in the kitchen – Langstroth's "friendly word to wives":

> *I would say to every wife – Do all that you can to make your husband's home a place of attraction. When absent from it, let his heart glow at the thought of returning to its dear enjoyments; as he approaches it, let his countenance involuntarily assume a more cheerful expression, while his joy-quickened steps proclaim that he feels that there is no place like the cheerful home where his chosen wife and companion presides as its happy and honored Queen. If your home is not full of dear delights, try all the virtue of winning words and smiles, and the cheerful discharge of household duties, and exhaust the utmost possible efficacy of love, and faith, and prayer, before those words of fearful agony,*
>
> *'Anywhere, anywhere*
> *Out of the world!'*
>
> *are extorted from your despairing lips, as you realize that there is no home for you, until you have passed into that habitation not fashioned by human hands, or inhabited by human hearts.*

Nancy didn't say anything right away, not even "don't you love how 19th century writers expressed such sublime thoughts?" It must have moved her even more than I expected.

"I have a friendly word not just to husbands, but to all beekeepers," she said. "First, I would say to every beekeeper, don't get propolis all over your dress shirts…"

"I needed a light colored shirt in the beeyard and who can tell the difference between a dress shirt and a work shirt?"

"All your dress shirts have propolis stuck to them. Second, there are dead bees in all the car's cup holders. Beekeepers ought to vacuum all dead bees."

"I already put that on my job list, right at the top. It's been first on the list since last Summer . . ."

"Third, there are two beehives on the back porch. Beekeepers should keep hives in one place . . ."

"They are just nuc hives," I corrected. (There is a good reason for those hives being on the porch. You can't just move hives a few hundred yards.)

". . . There's a third in the driveway, a fourth in the barn wall, a fifth on the porch roof . . ."

"That was a bait hive, until the swarm moved in last year."

". . . and I saw one of your lumber customers wearing an Epipen in a holster on his belt . . ."

"Yeah, I never saw that before! Weird!"

". . . and that smells like a lawsuit. Sixth . . ."

"You're on fourth, unless you are still counting stray beehives."

"Fourth, I'm missing a pair of new pantyhose."

"Don't look at me! I'm not that kind of guy . . ."

"You were straining honey in the honey room."

"Oh – that pantyhose! I didn't realize you were the sort who had to count everything."

"Fifth, remember that Reverend Langstroth spent a large portion of his time separated from his wife and living with his brother-in-law. My brother is looking for a nanny and his kids love you . . ."

"Whoa! Look at the clock! Time to, um, check the bear fence!" I closed the book and slipped out the door. It was already dark and the porch light had blown. Maybe I could patch things up by putting in a new bulb. Then I remembered; it had just blown out a couple months ago. I still had plenty of time.

The most important lesson I learned on my bad spouse day – if you find a piece of useful information and want to share it, just underline it, write "good advice!" in the margin and leave it open on her favorite chair. BC

Do Pesticides Kill Honey Bees

Malcolm **Sanford**

A recent spate of articles/comments in *Bee Culture* has focused on the effects of pesticides on honey bees. These tend to emphasize broad-ranging conclusions about these substances that are currently in vogue. They incorporate the roles pesticide manufacturers, regulators, researchers, beekeepers and the general public play in keeping specific points of view foremost in the minds of the general public. Unfortunately, these efforts are all too often not capable of creating a more discerning audience. With this in mind, the following is offered:

In an effort to manage the environment, humans have over a long period of time collectively developed chemicals known as "pesticides." This generic term seeks to bring all the "killing" substances or "cides" under one big umbrella, which includes insecticides, fungicides, herbicides, among a raft of others. "Killing" has become a loaded word over the years, so practitioners have increasingly turned to using the word "control" instead. Presently many of those intimately involved with these materials refer to themselves as "pest control operators." "Integrated Pest management" or IPM is another concept becoming more prominent. It indicates a relatively more-nuanced idea that pests should be "controlled" only when a certain damaging threshold is reached, and this might mean employing a number of techniques, including possibly physical, biological and chemical means together.

The first pesticides found to be damaging to honey bees were those being applied to agricultural crops, usually as dusts, such as mercury and arsenic. They were broad spectrum, inorganic and extremely dangerous materials, often derived from chemical warfare agents. It took some investigation by beekeepers and others to finally prove these inorganic chemicals were the culprits in large-scale honey bees kills.

Subsequent research has developed a number of types of alternative synthetic "organic" pesticides, which are more targeted to certain organisms, often insects. Thus, synthetic organic chemicals have increasingly displaced the dangerous inorganics beginning around 1946, when it was discovered that human lice populations were susceptible. The organic food industry further distinguishes between naturally occurring (found in nature) compounds and those that are manufactured (synthetic), often blurring the lines between the chemical definitions of organic versus inorganic.

Honey bees, as insects, were generally at greater risk from synthetic organic compounds. So continued attempts to minimize exposure through regulations became increasingly important in determining honey bee safety.

The most important and effective rules for insecticide use over the years have generally employed the words, "do not apply when honey bees are present and/or plants are in bloom." This is prominently displayed on many chemical controls via the product label, which is now approved by the Environmental Protection Agency (EPA) for each registered pesticide. The "label is the law" has also become a mantra for most organic insecticides, including those used by beekeepers themselves. The safest thing is not to use a pesticide at all, but if necessary the label's directions usually provide the most effective control, while minimizing impact on non-target organisms.

As a result of severe losses of honey bees across the United States due to increased used of organic insecticides, Congress passed the Beekeeper Indemnification Payment Program in 1970. This reimbursed beekeepers for chemical losses and was retroactive to 1967. The program was abandoned, however, because it appeared to do little to solve the basic problem, and there were increasingly rumors of beekeeper abuse. In 1970, the Environmental Protection Agency (EPA) was also established to develop regulations that were designed to reduce environmental challenges, including "protecting" honey bees, and also beekeepers, from insecticide losses.

The introduction of Penncap-M®, a microencapsulated insectide, caused beekeepers much difficulty in the late 1970s and 1980s. The small capsules that contained the insecticide were thought at first protect human applicators. But unfortunately they mimicked pollen, and so were inadvertently collected by adult honey bees, brought back to the nest, and fed directly to the brood.

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The encapsulated material, methyl parathion, did not necessarily target honey bees, but was extremely toxic due being directly introduced into the colony as food. Fortunately the material is no longer in widespread use and its "honey bee killing" attributes are now well known.

Over the years, research has looked at a number of classes of insecticides based on their chemical structure. Major types so far include pyrethrins (pyrethroids), carbamates, organophosphates, organochlorides, and the current new extremely controversial class, neonicotinoids. As these materials were developed and then marketed, it became apparent that each affected honey bees differently.

Thus, the answer to the question posed in the title of this piece always has been, "it depends." Press releases and those who aren't into digging into the toxic details of materials tend to want to stick with "yes" or "no" answers, when in reality for honey bees it's always been about "relative risk," sometimes referred to as "hazard."

Starting as early as the 1960s in fact, university researchers concentrated on direct effects of insecticides on worker honey bees. Most kills were diagnosed fairly easily by simply looking at the entrances of colonies, often clogged with workers poisoned in the field that just made it back to their parent colony before dying.

In "Effects of Pesticides on Bees," by L.D. Anderson and E.L. Atkins Jr. published in California Agriculture, December 1958, the authors stated: "To study the pesticide problem, research studies have been in progress since 1950. Precision laboratory test methods were devised for studying, primarily, the contact effect of pesticide dusts on honey bees – during the past eight years – more than 100 pesticides and nearly 100 pesticide diluents have been compared. In addition, to laboratory tests, over 25 large-scale field tests were made during the past five seasons with commercial application of pesticides in blooming seed alfalfa fields."

From these studies, investigators were able to categorize the materials into several groups of "relative toxicity," ranging from the highly toxic (should not be used around bees); to those that can be applied "when certain precautions are used"; moderately toxic (not to be applied directly on bees); and relatively nontoxic (applied around or associated with bees.) This was based on what is known as the LD 50 level, the amount of material needed to kill 50 percent of a relevant population.

These data were collected over a long period of time and became the basis for many cooperative extension bulletins assisting beekeepers in helping their bees survive. Fortunately, much of this information has been conserved and is readily available in C.A. Johansen and D.F. Mayer, Pollinator Protection: A Bee & Pesticide Handbook, Wicwas Press, 1990 (reprint). It is also available in a condensed manner in a smart phone application (APP) How to Reduce Bee Poisoning From Pesticides **https://catalog.extension.oregonstate.edu/pnw591**.

The model described above began with university researchers looking first at direct exposure and then ingestion of toxins by adult honey bees. This practice was abandoned in the 1990s and replaced by private enterprise, incorporating a paradigm shift in the regulatory process, which now contracts out much of the testing via the National Alliance of Independent Crop Consultants.

In the current environment, testing for toxicity has become increasingly complex with increased use of formulated products, sometimes more risky than their main active ingredient alone. Potential registrants are also now being asked to look at larval versus adult honey bees, along with sub-lethal and/or chronic effects, and increasingly, exposure of non-target species. Fortunately, the Environmental Protection Agency (EPA) continues to modify its risk assessment for pollinators, including bees. The current application environment also sports a bewildering number of tank mixes and various adjuvant possibilities that pose practical consequences when deployed in the field. After-the-fact mixing is possibly the most troubling application area, exacerbated by "pesticide cocktails" administered by "chemigation."

Given the current situation, it is no wonder that scientists, beekeepers and general public alike are wondering how to judge claims by an increasing number of information sources about the effects of pesticides on honey bees. This has especially been ramped up since appearance of so-called "colony collapse disorder" that appeared in 2006.

A key to this conundrum is found in the 1958 paper referenced above: "Precision laboratory test methods were devised for studying, primarily, the contact effect of pesticide dusts on honey bees..." The methods and data of these pioneering studies were open to viewing by the public and scientists in general. Fortunately, they have been preserved in various documents over the years and continue to be available in the book mentioned above by Johanson and Mayer.

The basic research model in that volume is entitled, "Sequential Testing for Bee Hazard," and consists of four basic steps to "...decide the toxicity and hazard of a pesticide":

1. Laboratory Test for Acute Contact LD50: concentration at which 50 percent of test organisms die (relative toxicity).
2. Residue Bioassay for RT25 and RT40: two residue tests at two, eight and 24 hours after application, required for any material used in a manner that might harm bees.
3. Subacute Feeding Study: any pesticide with an acute contact LD50 of less than 11 micrograms per worker bee.

4. Field Testing; required when data from previous steps indicate the pesticide may present a problem to bees.

Finally, a detailed flow sheet called "A Sequential Testing Scheme," was developed to guide practitioners through the process. Again, the key to the success of this system was its transparency and that the techniques were agreed upon and collectively recognized as suitable by most experts in the field.

Another way to look at these in the modern setting is they were "Good Laboratory Practice (GLP)," at the time. The specifics of GLP are critical to provide confidence in the accuracy and precision of measurements. Conforming to them weeds out careless, undefined, and erroneous observations.

A specific case comes to mind with reference to one protocol of many that examines pesticide toxicity to honey bee larvae in the current research environment:

"Acute toxicity of five pesticides to Apis mellifera larvae reared in vitro," by Pingli Dai, et. al., Published online in Wiley Online Library: 24 July 2017, (**wileyonlinelibrary.com**) DOI 10.1002/ps.4608

The background states: "Honey bee larvae can be exposed to pesticides in contaminated nectar, pollen and wax. Due to the difficulties of rearing larvae in vitro, research focusing on adult bee exposure to pesticides is more common than that on larva exposure to pesticides. Herein, we aimed to assess the acute toxicity of five insecticides to honey bee larvae using an improved in vitro rearing method."

A summary of the results showed: "LC (lethal concentration) 50 and LD (lethal contact dose) 50 were calculated for larvae at 72 h following a single diet exposure administered when the larvae were 84 ± 12 h old. Solvent control larval mortalities were less than 15% at 72 h. The LC 50 values (mg L −1) for each tested pesticide were as follows: amitraz, 494.27; chlorpyrifos, 15.39; coumaphos, 90.01; fluvalinate, 27.69; and imidacloprid, 138.84. The LD 50 values in µg per larva were 14.83 (amitraz), 0.46 (chlorpyrifos), 2.70 (coumaphos), 0.83 (fluvalinate) and 4.17 (imidacloprid)." The conclusion revealed: "The toxicity of the test pesticides to honey bee larvae from most to least toxic was chlorpyrifos > fluvalinate >coumaphos = imidacloprid > amitraz."

The technique used here is an "improved in vitro rearing method" featuring a unique suite of controls. Experimental controls are vital in any kind of research. They are basically the only way results can be compared with any degree of confidence. In this protocol, three specific controls were used: Positive, Negative and Solvent. A recent so-called "ring test" revealed an 85 percent congruence (13 of 16 laboratories agreeing) among potential testing facilities that this procedure be adopted as a routine part of honey bee larval environmental risk assessments.

Now comes word that research on enzymes in honey bees showing they detoxify certain pesticides is opening up a new line of inquiry. A specific subfamily of enzymes appears to be involved. In a recent paper, "CYP9Q-mediated detoxification of acaricides in the honey bee (Apis mellifera)," published by Wenfu Mao, et.al., PNAS August 2, 2011. 108 (31) 12657-12662; , the following appeared: "Results of this appear to show that in-hive acaricides (chemicals used for mite control), including the pyrethroid tau-fluvalinate and the organophosphate coumaphos might be rendered less toxic due to these."

And on the heels of this, a further joint study has discovered these might also render some neonicotinoids less poisonous. "Identifying these key enzymes provides valuable tools to screen new pesticides early in their development to see if bees can break them down," said Professor Chris Bass, who led the team at the University of Exeter.

Dr Ralf Nauen, insect toxicologist and lead investigator of the study at Bayer added: "Knowing the mechanisms contributing to inherent tolerance helps us and regulators to better understand why certain insecticides have a high margin of safety to bees."

"The knowledge from our study can also be used to predict and prevent potential harmful effects that result from inadvertently blocking these key defence systems, for instance by different pesticides (such as certain fungicides) that may be applied in combination with insecticides."

Professor Lin Field, Head of the Department of Biointeractions and Crop Protection at Rothamsted Research added: "Some neonicotinoids are intrinsically highly toxic to bees but others have very low acute toxicity, but in public debate they tend to get tarred with the same brush. Each insecticide needs to be considered on its own risks and merits, not just its name."

Another tack on protecting honey bees from pesticides comes from researchers at Washington State University, who are developing a new material that attracts pesticide residues in honey bees. They are introducing certain micro-particles in the digestive tract that act like a sponge, absorbing minute amounts of toxic materials that increases a honey bee worker's life. Testing is continuing.

All this, of course, leads us full circle back to the question, "Do Pesticides Kill Honey Bees?" Could a future answer to this question in fact, be a qualified no? BC

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BXML Part 1
The Power of BIG Data & Analytics

Joseph **Cazier**
Walter **Haefeker**

Enough Data To Build A True Genius Hive

Introduction

In previous articles in this series, such as "Peering Into the Future: The Path to the Genius Hive," published in the April 2018 issue of *Bee Culture*, we discussed the importance of data science to build tools like the Genius Hive to benefit beekeepers. In this article, we will discuss one of the most critical components to building that future, large amounts of interchangeable standardized data related to bees, bee health, and hive outcomes.

It is only with this type of data, in large enough quantities and with sufficient quality, that it will become possible to build a true genius hive. Recall that this *Genius Hive* is one that can guide the hive management process by taking the collective wisdom from millions of hives to optimize the best outcome for the bees, beekeepers, and the crops they pollinate.

The best way to get the data needed to build tools such as a Genius Hive is to develop and adopt a data standard. In this case, a standard would be a consistent way of recording important data related to bees and beekeeping. If everyone recorded their data in the same way, it could be aggregated and analyzed to provide insights relevant to all of us.

To start the process of developing a data standard, a few of us, under the leadership of Walter Haefeker, President of the *European Beekeepers Association* and co-author on this article, proposed the formation of an Apimondia Working Group (AWG). This working group, AWG 15 for the *Standardization of Data on Bees and Beekeeping*, was approved during the Apimondia World Bee Congress in Turkey in October of 2017[1]. AWG 15 will develop a standard for all data relevant to beekeepers, including human observation, hive sensors, environmental data, hive history, and genetics.

There is already a well-defined general technical language to let data flow freely between different systems. It is called Extensible Markup Language (XML). In this article, part one on the topic of standardization, we will focus on the benefits to all of adopting and using an XML based data standard we are calling *BeeXML* for the beekeeping sector[2].

In this paper, we provide more detail on the how and why of data science than previous articles in this column to convey the potential of what could be achieved if we all work together to build and adopt a data standard like this. Specifically we focus on what could be done with data science to help bees and beekeepers everywhere with data from the open source data standard we are developing.

Next month, in part two of this series, we will address the *technical challenges* of building a data standard by going into the mechanics of BeeXML, and explain why XML is a good choice on which to build a data standard for our sector, followed by part three focused on *human challenges* like privacy issues to adopting a data sharing platform like BeeXML.

Data Science and Beekeeping

Data science is about making smarter decisions with data. The larger, more relevant and more trustworthy the data, the better the decisions one can make. Data scientists use sophisticated machine learning algorithms to test thousands of hypotheses simultaneously on hundreds (or more) possible variables impacting a decision or desired outcome.

Inputs for Good Data Science

A data scientist, for example, might look at weather patterns, geolocation, bee genetics, hive history, pest and pathogen vectors, nearby crops, biodiversity, and regional environmental factors to measure, predict, and ultimately improve, hive outcomes. This becomes possible due to the ability to control for variance across a wide variety of inputs and outputs. With enough data to analyze each item's impact individually in various circumstances, along with likely interactions, we can begin to understand which factors are driving which outcomes under which conditions.

Once these factors are understood, they can be predicted. In reality, it often also works in reverse: sometimes you can predict things empirically, which are not well understood, but clearly associated with a high degree of statistical validity, and then go back to those

[1] https://www.efsa.europa.eu/sites/default/files/event/171204-0-p06.pdf

[2] www.BeeXML.org

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things to see if a probable cause can be understood and validated. Most importantly, once something can be predicted and understood, measures can be taken to both avoid problems and optimize opportunities.

How Science Works

Let's take a moment to explain how and why this works. Most people are familiar with a controlled experiment or the concept of a double-blind clinical trial to test the effects of a potential new drug, such as the one depicted in Figure 1. In these cases, great care is taken to control for every type of variance possible (hence the name controlled). For example, researchers might control for physician or patient bias by making the experiment double-blind so neither the physicians nor the patients know whether they are getting the drug or placebo. This method controls for bias because even if physicians/patients love (or hate) the idea behind the drug, they cannot even unconsciously influence the experiment. In so doing, the researchers eliminate a possible source of bias and can then have more confidence in the results.

Randomizing the assigned treatment (receive drug) and control (receive placebo) has a similar effect in that it helps control for variations in people (or plants, or animals, or hives, etc.) being treated. The rationale is that even if there is a bias, such as a genetic variation in a participant, this bias will be distributed randomly, as opposed to systematically, and thus the results of the experiments can be trusted with a greater degree of certainty.

Figure 1. *A depiction of the three V's of Big Data*[3]

Randomized controlled experiments have long been the gold standard for advancing science, and for good reasons. By controlling for bias and variance, it gives us great confidence in the findings and helps science advance. This is especially true as the participant number (*n)* increases, because as the number of study participants experiencing an effect increases, the greater the confidence we also have in the effect. Likewise, if a study can be replicated (repeated by others with the same or similar results) that also increases our confidence in the efficacy of what we are testing as real.

How Data Science Approximates the Results

Let's now look at how we can approximate this process with big data techniques. First, we should note that big data analytics techniques are a supplement to, not a replacement for, rigorous controlled experiments. However, both can help us learn what is true when it comes to medicine, bees, or anything else. The first key is in controlling for variance. As mentioned above, controlling for variance helps us have more confidence in the effectiveness of what we are testing: by controlling for other possible causes of the item being studied, we can eliminate them as key factors to consider and thus have more confidence that what we are studying is causing what we think it is.

Double-blind controlled experiments do this through randomization, participant matching, double-blindness, replication, mathematical modeling, or other means. In data science, we also control for variance, but we do this by having a large enough pool of data that we can observe what amounts to a series of natural experiments. By having enough data, thousands of times what you might have in a typical controlled experiment, trends emerge that can be naturally grouped together or clustered in a way that begin to show patterns that may imply (but not generally prove) cause and effect. These detected patterns can further be explored either through more data, time sequencing, an intervention, or a controlled experiment.

A Practical Application with Data Volume, Variety, and Velocity

Imagine that we have hundreds of thousands of beekeepers diligently recording, either through human observation or remote sensing, the state of their bees (primary data). Let's further imagine that we can match this data to weather patterns from local weather stations in each area (secondary data). Let's again imagine that we can use satellite images to look at the infrared reflective light pattern of plants growing in the area and identify which crops or natural plants are around a hive. Next, let's assume we can extrapolate likely pesticide use near by, based on all of these factors (or, even better, records of actual use).

Finally, let's imagine what could be done with hundreds of thousands of beekeepers around the world reliably sending primary data to a place that could merge them with secondary data and analyze them. This large volume of data, coupled with its variety (mostly from secondary sources), sent in near real time (velocity), and recorded over extended time periods, make up the three most famous Vs of Big Data (Volume, Variety and Velocity), as depicted in Figure 1.

Together these Vs form the basis for finding both similar and distinct data clusters and grouping them together in a way that controls for a large portion of the variance by, for example, holding weather, genetics, cropland, hive history, or other factors constant. By controlling for these factors, we can start to see what happens as only a few of those variables change. In this way, we can approximate the certainty of what we can learn from randomized controlled experiments, but much

[3]https://blog.dellemc.com/en-us/mlb-a-big-fan-of-big-data/

faster over a greater number of data points. The volume of data also generally leads to greater statistical power, enhancing the chances of finding an effect if it exists. As another bonus, because the data set is generally passively collected (especially the secondary data), it helps us avoid other confounds like the placebo effect or participant bias that often haunt medical trials.

Decision Support Systems

Once we control for these factors and apply these big data analytics techniques, we can usually distill the results down to a few understandable algorithms or rules that can be built into *Decision Support Software* (DSS), which is a data-driven software application to help people make smarter, faster and more efficient decisions. When loaded with the proper algorithms, this software system, or in this case *Apiary Management System,* can guide beekeepers by synthesizing the wisdom, knowledge, and experience of hundreds of thousands of beekeepers. This is what we aspire to build at **HiveTracks.com** as shown in Figure 2.

Note that one of the big challenges to building this type of decision support software will be getting the incentives right to encourage people to use the system and contribute their data to its continual improvement. We are keenly aware that some may have privacy and other concerns about this. While we don't have space to address these privacy and data ownership concerns clearly in this paper, we plan to do so in a follow up devoted to this topic, part three of this series. This way we can keep the focus of this article on the benefits of adoption, part two on the technical mechanics and part three on the challenges and opportunities inherent in this type of data collection system.

Geographic Information Systems

In many cases, trouble can be avoided and opportunities addressed proactively, before they happen or while there is still time to take advantage of them. For example, I saw a presentation by Awad Hassan, from South Valley University in Egypt, at Apimondia 2017, on some of the work he and his colleagues are doing to integrate *Geographic Information Systems (GIS)* into their beekeeping operations. Figure 3 shows and illustration of an Apiary Management System enhanced with GIS technology.

As I recall, when they linked hive *Global Positioning System (GPS)* coordinates to satellite imagery of a regional oasis, they found that nearly 50% of the forage was going unpollinated (due to distance from the hive), which was suboptimal for both the plants and the amount of honey the bees were able to produce. This is an area where a guided decision support system enhanced with GIS technology and hive geolocation tags could provide a lot of value to migratory beekeepers and the crops their bees pollinate.

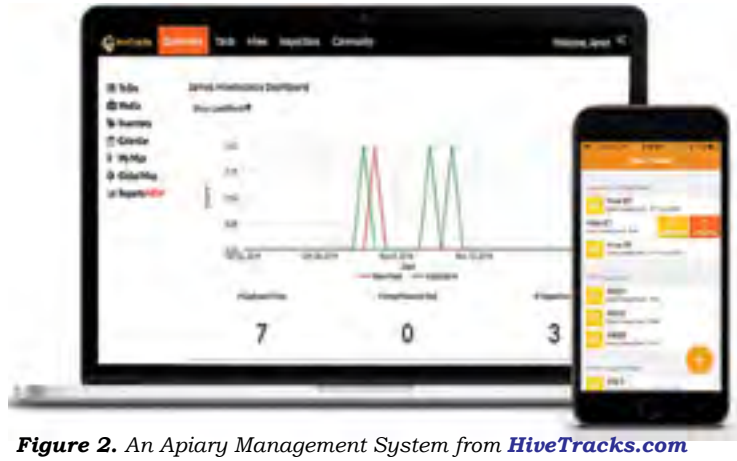


Figure 2. *An Apiary Management System from* ***HiveTracks.com***

Status Alerts

A promising application for these decision support systems is in generating status alerts. After we apply the machine learning algorithms to our large amounts of data and distill out the key factors impacting an event, such as likely loss of a queen, an infestation of Asian Hornets, or a *Varroa* flare up, we can watch the incoming data and provide an alert early enough to be useful. Imagine receiving a text message from your hive, a week before your next planned inspection, telling you of a fluctuation in hive temperature, which very likely indicates that the queen is in trouble.

These applications can be applied with a lot less data and computer processing power because the insights and wisdom from the big data analysis can be distilled and encoded into *Event Time Processing* systems that can manage incoming data in real time.

These types of status alerts can be highly valuable to beekeepers and increase the chances of saving a hive or having better outcomes. The key is actionable information. The sooner you receive the relevant information, the sooner you can act on it and improve the current and future situation. However, it needs to be news you can use to be relevant and valuable beyond a post mortem scientific inquiry.

Figure 3. *An illustration of a Geographic Information System.*

Predictive Alerts

While GIS systems are best if they are about the past (e.g. optimizing placement before moving your hive) and status alerts are about the present (e.g. what is happening now in the hive), predictive alerts are about the future. These alerts tell you what is likely to happen next to your hives. By looking at tens of thousands of similar hives in similar situations and comparing outcomes of those hives, we can build an algorithm, such as a decision tree or neural network, that can take all of the inputs into your hives and give probabilistic outcomes for various possible scenarios.

Optimization Algorithms

Another important outgrowth from applying data science to large amounts of standardized data is the ability to develop optimization algorithms optimized for a given hive in a given data cluster with a common set of important properties. Whereas prediction is about predicting the future, optimization is about creating the future you want.

Once these hive data clusters are properly identified for a given set of condition (e.g. *Varroa* infestation), we can then see how each hive data cluster has reacted to different treatment options in different states of a given condition. For example, perhaps a hive on the coast might do better with a given treatment then one in a mountain region (with a different history, genetics, and ambient environmental pressures), which might favor a different course of action for a similar condition.

As we have enough data to begin to understand all of these factors (this will take years of standardized data aggregated at a large scale), we can begin to embed optimization algorithms that will not only be able to predict the probability of a problem, but can also give a probability that a given treatment will work *for your hives* as opposed to a generic treatment.

HiveTracks
KNOW YOUR BEES

Figure 4. *HiveTracks Logo and Motto – Know Your Bees.*

The most essential aspect to making these technologies work for the beekeeping sector will be the topic of our next article. Using BeeXML, a special language and data standard, allows us to get the data we need to climb the mountain. This is a critical step that involves adopting a data standard and sharing the data in a way that can be used to benefit all bees and beekeepers. Without this standard, developing tools like the Genius Hive will take many times longer and be of lower utility. Please stay tuned for our article next month titled "BeeXML Part II: Achieving the Goal of Standardized Data" and than "BeeXML Part III: Data Challenges and Opportunities" the following month.

Finally, special thanks to *Project Apis m.* for supporting a portion of this work with a Healthy Hives 2020 grant, to the publishers at *Bee Culture* for letting us share these ideas, and to Apimondia for creating this important working group (AWG15). Also special thanks to my friends at **HiveTracks.com** who are working with me to help build a Genius Hive so we can all know our bees better as shown by their logo in Figure 4. Our efforts would not be possible without visionary groups like these providing support and resources. BC

A Closer LOOk

HONEY BEES AND MAGNETIC FIELDS

Clarence **Collison**

Is there a pull?

Over the years scientists have been interested in determining the effect of electromagnetic energy on colonies placed near power lines, on individual dancing and foraging behavior and recently the effect of cell phone towers on colony collapse disorder (CCD).

Honey bees orient to the earth's magnetic field. This ability may be associated with a region of transversely oriented magnetic material in the front of the abdomen. The magnetic moment apparently develops in the pupal state and persists in the adults (Gould et al. 1978). There are at least three general mechanisms which might be used by animals to detect the earth's magnetic field. The first requires the organism to possess a device to measure the charge separation that is induced when it moves through the earth's field. A second method of detection might be accomplished by using permanent magnets that like compass needles produce a measurable torque as they attempt to twist into alignment with the earth's field. The third strategy would require the organism to have paramagnetic substances-molecules which, in the presence of an external field, produce additional magnetism parallel to the external field. In order for this hypothesis to be involved, the animal would need to possess superparamagnetic domains – tiny ferromagnetic crystals which easily align their magnetism in the direction of the applied field. Evidence has been found in honey bees which favors this last possibility (Gould et al. 1980).

Honey bees have the ability to detect small fluctuations in the Earth's magnetic field. Behavioral studies with worker honey bees have revealed four reproducible effects of magnetic fields on orientation. 1)There are small Missweissungs, or misdirections, in the waggle dance which can be changed by altering external magnetic fields around the comb (Kuterbach and Wolcott 1986a). In their dances, bees convert the angle flown to the food with respect to the sun into an angle danced in respect to gravity. In this conversion, bees make small regular errors which depend largely on the orientation of the dance with respect to the earth's field. Cancelling the field causes the errors to disappear (Gould et al. 1978). 2)Honey bees will, in the absence of other external cues, build new comb in the same magnetic direction as the parent hive (De Jong 1982). 3)When placed on a horizontal comb, honey bee dancers will gradually over time orient to the four cardinal points of the magnetic compass. 4) Honey bees can set their circadian rhythms to the earth's geomagnetic fluctuations (Gould 1980). More recently, Walker and Bitterman (1985) have reported that honey bees can be trained to discriminate between magnetic fields of different intensities. Although this behavioral evidence suggests that honey bees can detect weak earth-strength magnetic fields, the sensory system involved in this behavior is not fully understood.

Honey bees are sensitive to earth strength magnetic fields and are reported to contain magnetite (Fe_3O_4) in their abdomens. Kuterbach et al. (1982) reported bands of cells around each abdominal segment that contain numerous electron-opaque, iron-containing granules. The iron is principally in the form of hydrous iron oxides rather than crystalline magnetite. However, it is a form which is a direct precursor of magnetite. Further examinations found particulate iron within the trophocytes (cells associated with the fat body with a nutritional function) of the fat body of the adult bee (Kuterbach and Wolcott 1986a). These iron granules differed in their structure and composition from iron granules found in other biological systems. The granules had an average diameter of 0.32 ± 0.07 µm and were composed of iron, calcium and phosphorus in a non-crystalline arrangement. The granules were apparently randomly distributed within the cytoplasm of the cells, and were not associated with any particular cellular organelle. Electron microscopy revealed the presence of cell junctions between the trophocytes. Small gaps were seen between the outer leaflets of the cells forming the cell junction. Physiological studies showed that these cells are electrically coupled, but the coupling ratio is low, as a result of extensive coupling to many cells.

The development of iron granules in honey-bee tissues was further investigated by Kuterbach and Walcott (1986b) using both anatomical and analytical methods. Iron granules are present only in the trophocytes of post-eclosion adults and have the same elemental

composition as those in foraging adults. The granules increase in both size and number during ageing. Iron levels in developing worker honey bees were measured by proton-induced X-ray emission spectroscopy. The rate of iron accumulation was directly related to iron levels in the diet, and the iron can be obtained from both pollen and honey. In adults, the iron content of the fat body reached a maximum level (2.4 ± 0.15 µg mg^{-1} tissue), regardless of the amount of iron available for ingestion. Maximal iron levels are reached at the time when honey-bee workers commence foraging behavior, suggesting that iron granules may play a role in orientation. Alternatively, accumulation of iron in granules may be a method of maintaining iron homeostasis.

Honey bees undergo iron biomineralization, providing the basis for magnetoreception. Hsu and Li (1994) showed the presence of superparamagnetic magnetite in iron granules formed in honey bees, and subscribed to the notion that external magnetic fields may cause expansion or contraction of the superparamagnetic particles in an orientation-specific manner, relaying the signal via cytoskeleton. Hsu et al. (2007) established a size-density purification procedure, with which quantitative amount of iron granules was obtained from honey bee trophocytes and characterized; the density of iron granules was determined to be 1.25g/cm^3. While they confirmed the presence of superparamagnetic magnetite in the iron granules, they observed changes in the size of the magnetic granules in the trophycytes upon applying additional magnetic field to the cells. A concomitant release of calcium ion was observed by confocal microscope. This size fluctuation triggered the increase of intracellular Ca^{+2}, which was inhibited by colchicines and latrunculin B, known to be blockers for microtubule and microfilament syntheses, respectively. The associated cytoskeleton may thus relay the magnetosignal, initiating a neural response.

Honey bees have the ability to detect the Earth's magnetic field, and as indicated, the suspected magnetoreceptors are the iron granules in the abdomens of the bees. To identify the sensing route of honey bee magnetoreception, Liang et al. (2016) conducted a classical conditioning experiment in which the responses of the proboscis extension reflex (PER) were monitored. Honey bees were successfully trained to associate the magnetic stimulus with a sucrose reward after two days of training. When the neural connection of the ventral nerve cord (VNC) between the abdomen and the thorax was cut, the honey bees no longer associated the magnetic stimulus with the sucrose reward but still responded to an olfactory PER task. The neural responses elicited in response to the change of magnetic field were also recorded at the VNC.

Experiments have demonstrated that free flying honey bees are able to detect static intensity fluctuations as weak as 26 nT (nT= nanotesla= 1 billionth of a tesla which is a unit of magnetic flux density) against the background, earth strength magnetic field. We report here an extension of this work to weak, alternating fields at frequencies of 10 and 60 Hz (Hz = Hertz which is a unit of frequency = 1 cycle/second). Their results indicated that the sensitivity of the honey bee magnetoreception system decreases rapidly with increasing frequency. At 60 Hz, alternating field strengths above 100 µT are required to elicit discrimination. These results are consistent with biophysical predictions of a magnetite-based magnetoreceptor (Kirschvink et al. 1997).

Honey bees are sensitive to earth strength magnetic fields and are reported to contain magnetite (Fe_3O_4) in their abdomens.

The biogenic magnetic properties of the honey bee were investigated with a view to understanding the bee's physiological response to magnetic fields (Desoil et al. 2005). The magnetizations of bee abdomens on one hand, and heads and thoraxes on the other hand, were measured separately as functions of temperature and field. Both the antiferromagnetic responses of the ferrihydrite cores of the iron storage protein ferritin, and the ferromagnetic responses of nanoscale magnetite (Fe_3O_4) particles, were observed. Relatively large magnetite particles (ca. 30 nm or more), capable of retaining a remnant magnetization at room temperature, were found in the abdomens, but were absent in the heads and thoraxes. In both samples, more than 98% of the iron atoms were due to ferritin.

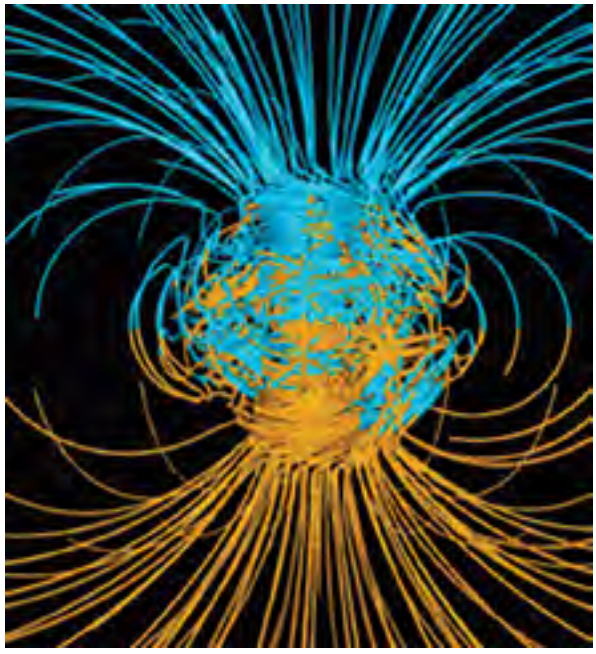
Individual honey bees were trained in two experiments to come for sucrose solution to a target set on a shelf before an open laboratory window. On some visits, the target was presented in the ambient geomagnetic field, and on other visits in a field modified in the vicinity of the target by passing a direct current through a coil under the shelf. The target contained 50% sucrose when it was in one of the two fields and 20% when it was in the other. Tested subsequently with a pair of targets, one in the ambient field, one in the modified field, and both containing tap water, the workers significantly preferred the target in the field in which they had been given the 50% sucrose during training. Four modified fields, produced with different coils and currents, were discriminated equally well from the ambient field, and performance was as good when the 50% sucrose was given in the ambient field as when it was given in the modified field. Data are provided also to illustrate the excellent discriminative performance attainable when two targets are presented on each training visit – one in a modified field, the other in the ambient field – and choice of one is rewarded with 50% sucrose while choice of the other is punished with mild electric shock. Their results show that foragers attend to magnetic stimuli at the feeding site and that discriminative training techniques are appropriate

Honey bees have the ability to detect the Earth's magnetic field, and as indicated, the suspected magnetoreceptors are the iron granules in the abdomens of the bees.

Honey bees exploit the geomagnetic field for orientation during foraging and for alignment of their combs within hives.

for the study of magnetoreception and its mechanism in honey bees (Walker and Bitterman 1985).

Adult honey bees possess a magnetoreception sense similar to other animals. Ferrari (2014) investigated the possible involvement of a magnetoreaction disorder to explain the loss of forager homing abilities. Magnetized wires were glued to honey bee abdomens, foragers were exposed to artificially induced fluctuating magnetic fields, and untreated foragers' return rates were monitored during naturally occurring disturbances to Earth's magnetosphere. Treated and untreated foragers were released at varying distances from their hives and their return rates were monitored. Significant differences in their return rates indicated that interactions existed between forager losses and exposure to both static and oscillating magnetic fields, as well as during fluctuations in the Earth's magnetosphere. In addition, decreases in untreated forager return rates also correlated with increasing intensity of extraterrestrial protons that entered the Earth's atmosphere. Finally, Winter colony losses in the northeast USA also correlated with annual geomagnetic storm occurrences. Collectively, these five observations indicate that coronal eruptions on the Sun are involved with interference of a forager's magnetoreception sense here on Earth.



Honey bees exploit the geomagnetic field for orientation during foraging and for alignment of their combs within hives. Veronika et al. (2017) tested the hypothesis that honey bees sense the polarity of magnetic fields. They created an engineered magnetic anomaly in which the magnetic field generally either converged toward a sugar reward in a watch glass, or away from it. After bees in behavioral field studies had learned to associate this anomaly with a sugar water reward, they subjected them to two experiments performed in random order. In both experiments, they presented bees with two identical sugar water rewards, one of which was randomly marked by a magnetic field anomaly. During the control experiment, the polarity of the magnetic field anomaly was maintained the same as it was during the training session. During the treatment experiment, it was reversed. They predicted that bees would not respond to the altered anomaly if they were sensitive to the polarity of the magnetic field. Their findings that bees continued to respond to the magnetic anomaly when its polarity was in its unaltered state, but did not respond to it when its polarity was reversed, support the hypothesis that honey bees possess a polarity-sensitive magnetoreceptor.

Walker et al. (1989) trained individual honey bees to feed to repletion from a well of sucrose solution so constructed that shock could be delivered when the proboscis was in contact with the solution. If shock was signaled by vibration of the substrate or by an airstream, the bees learned readily to avoid it by breaking contact briefly, but there was no response to change (either constant or time-varying) in the ambient magnetic field. When, however, a magnetic field anomaly in the region of the food well signaled to flying bees that contact would be punished with shock, hesitation to settle was greater in presence than absence of the anomaly. Parallel results were obtained with light, to which flying bees clearly responded but to which stationary bees hardly responded at all. They concluded that stationary bees detect magnetic field stimuli but do not process them successfully in the training situation.

Upon entering a new home site a honey bee swarm is faced with the task of organizing the building activities of thousands of component bees so that several straight and parallel vertically oriented combs can be quickly and efficiently built. As a part of this organization process it is necessary for the bees to select and agree upon a planar orientation for the new combs. De Jong (1982) presented evidence that memory of a previously used comb direction influences the building of the new set of combs. Swarms which have recently moved into bait-hives (empty boxes placed in trees to attract feral swarms) tend to maintain the previously used comb direction when removed and forced to build new combs, whereas swarms which have occupied the bait-hives for a longer period (over 9 days) do not. Recent swarms predictably alter their comb building direction within the influence of an applied earth strength magnetic field, indicating that honey bees are able to use the earth's magnetic field as a reference at the commencement of comb construction in a new hive.

Hemolymph samples from adult bees that had completed their pupal development and emergence in a 7 Tesla field contained a lower percentage of glucose than controls, indicating that trehalase enzyme activity in honey bees is reduced in strong magnetic fields. Significantly more phospholipids were found in the intestines of magnetic field-exposed bees than in controls.

No significant differences were found for fatty acids, triacylglycerols, or steroids (Kefuss et al. 1999). BC

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FOUND IN TRANSLATION

Love In The Time Of Chasmogasmy: How And When Do Bees Improve Soybean Yields?

Jay **Evans**, USDA Beltsville Bee Lab

As I wrote two months ago, the Intel International Science and Engineering Fair (**https://student.societyforscience.org/intel-isef**) had plenty of optimistic news for bees and their roles in nature and agriculture. Brooklyn Pardall (Central Lee High School, Iowa) highlighted research she carried out on her family's 6,000 acre soybean farm, showing significant benefits from the exposure of production soybean plants to honey bees. Soybeans represent a crop where the benefits of insect pollinators are complex and surely underestimated. In theory, soybeans could provide a ubiquitous resource for beekeepers seeking new flowers and profits, assuming growers in fact see an increase in yields when bees (wild or managed) are on the scene. This month I delve into the long history of research on insect pollination and soybean yields. Like a lot of research, this topic sometimes feels like *déjà vu* all over again, but it is clear that more could be done to advertise soybean cultivars and conditions that benefit from bee pollination and to incentivize beekeepers to take the plunge into a widespread floral source. Given hard evidence, soybean growers might choose cultivars and safe management techniques that reward bees and beekeepers. Soybeans cover 90 million acres in the U.S. (**http://usda.mannlib.cornell.edu/usda/current/CropProdSu/CropProdSu-01-12-2018.pdf**), so if even a fraction of this landscape joins the pollen-nation that seems like a potentially big deal.

A first stop on any pollination quest, especially for a non-specialist like me, is USDA researcher S.E. McGregor's 'Insect Pollination of Cultivated Crop Plants (1976, **https://www.ars.usda.gov/ARSUserFiles/20220500/OnlinePollinationHandbook.pdf**). McGregor was not big on bee pollination of soybeans to say the least, stating "the soybean is considered to be self-fertile and not benefited by insect pollination" and "there are no recommendations for the use of bees in pollination of soybeans". Still, he does leave the door open a bit with "although there is no experimental evidence to support them, some soybean growers in Arkansas have indicated that bees increase production of beans, and they encourage the presence of apiaries near their fields." And my favorite sign of smoke, amidst a discussion of how outcrossing 'could' improve yields is "various tests have been conducted to determine the amount of cross-pollination that occurred at different locations, but the agents responsible for the crossing obtained were usually not determined, possibly because the tests were conducted by agronomists who did not consider themselves qualified to record these observations".

Dr. Eric Erickson apparently ignored his USDA colleague's pessimism and set off at the same time on a research program to measure the impacts of honey bees on soybean yields. With collaborators including a young Kim Flottum, Dr. Erickson mapped out some of the benefits of bee pollination to soybean yields in the mid-1970s, beginning with "Effects of honey bees on yield of three soybean cultivars" (*Crop Science*, 1975, **https://dl.sciencesocieties.org/publications/cs/abstracts/15/1/CS0150010084**). Dr. Erickson provided experimental data from the field to counter the dogma that bees have a minimal impact on soybean yields. As hinted by the title, not all soybean varieties attract bees nor do they all provide good forage for bees. The 'Hark' variety was the most chasmogamous ('open marriage' for insect pollinators) and indeed plants of this variety showed 7% and 16% yield increases when exposed to bees, in successive years. Two varieties with closed flowers (cleistogamous) showed no benefit from bees and few visitors. Wainer Chiari and colleagues also showed that varieties make the difference, with bees (nearly always honey bees in their study) boosting productivity of Brazilian cultivar BRS-133 by over 50% (*Brazilian Archives of Biology and Technology*, 2005, **http://www.scielo.br/pdf/babt/v48n1/a05v48n1.pdf**). Presumably, BRS-133 is a variety that thrives on cross-pollination and its associated influx of genetic diversity. Finally, Diego Blettler and colleagues in Argentina recently showed an 18% yield increase when soybeans were exposed to insects in one year, but no impact for the same soybean cultivar the second year (A*pidologie*, 2018, **https://link.springer.com/article/10.1007/s13592-017-0532-4**). The honey bee chauvinist in me says these benefits point to the immense roles of honey bees in crop production, but there is good evidence that other bees are playing significant roles in increasing the soybean crop. Marcelo de O. Milfont and colleagues in Brazil found that native bees alone boosted soybean yields by 6% while honey bees added 18% on top of that (Higher soybean production using honeybee and wild pollinators, a sustainable alternative to pesticides and autopollination, *Environmental Chemistry Letters*, 2013, **https://link.springer.com/**

article/10.1007/s10311-013-0412-8). Recent work in the U.S. suggests that multiple pollinators can still be found in soybean fields (**Defining the insect pollinator community found in Iowa corn and soybean fields: Implications for pollinator conservation**, by Matthew O'Neal and colleagues, 2016, *Environmental Entomology,* **https://academic.oup.com/ee/article/45/5/1099/2197225**), and these pollinators are likely to enable gene flow in soybeans alongside honey bees.

Despite the observed benefits from these and other studies, growers will not be convinced to welcome bees until there is more clarity on specific cultivars that benefit from pollination and the conditions needed for strong bee-enabled 'marriages'. Surprisingly given its role as the leading row crop in many countries, there does not seem to be a concerted effort to identify specific soybean varieties that benefit from the gene flow provided by insect pollinators, nor are there steady recommendations for pollinator density in production soybeans.

So what is the big picture for U.S. soybean production, and can the soybean crop be made to be more bee-dependent, and bee-friendly? Nicholas Calderone produced an ambitious summary of the impacts of honey bees and other pollinators on U.S. crop production ("Insect Pollinated Crops, Insect Pollinators and US Agriculture: Trend Analysis of Aggregate Data for the Period 1992–2009" (*PlosONe*, 2012, **https://doi.org/10.1371/journal.pone.0037235**), as a follow-up to work by himself and Roger Morse in 2000. Using USDA data, he calculates acreages and productivity for a range of commodities that depend on, or benefit to some extent from, pollinators. Soybeans make this list, albeit with an estimated 10% boost from insect pollination. This 10% is no-doubt an informed choice but it misses the nuances of which varieties are 'open' to bees, which planting schemes favor pollination and gene flow, and which soybean management practices are at least somewhat bee friendly. Ten percent of 90 million acres is still substantial, and for 2010 Calderone estimates that bees provide nearly $4 billion in value for soybean growers, arbitrarily split between honey bees and all other pollinators. This surpasses the $2.8B in pollinator benefits for almonds in that year, effectively all from honey bees despite inroads recently from alternate managed or wild pollinators. To be sure, almonds are a high-value crop grown on 1% of the acreage used by soy, but if conditions could be worked out between soybean growers and beekeepers that provide growers substantial benefits and beekeepers some profit and safe forage there seems to be plenty of space for some chasmogasmy. If so, the incentive and insights will come from researchers such as Ms. Pardall who know and care for both sides of this plant-pollinator relationship. BC

BIGGER PICTURE

Jessica **Louque**

Tier II Tunnel Study Basic Design

I've written some in the past about the general ins and outs of this type of honey bee research, but I thought some of you might find it interesting to see a little more depth in the types. Tier II for the testing is where the field work really comes in, as everything in Tier I is relatively lab-based, or some lab-to-field translational work. Tunnel studies are fairly common for most chemical testing, and it's not only for insecticides, but any pesticides that might pose a risk with possible high exposure scenarios. I might be stepping into a little hot water here, but we have attempted to do these with GMO crops and we couldn't prove a difference in the pollen collected between GMO and non-GMO varieties – as in, there was no way to distinguish which was which. I guess that could be taken two ways; either it's bad because the GMOs can pass as non-GMOs, or it's good because there's literally no difference.

As always, the Tier II studies have general guideline requirements that have to be met. If you are interested, all of the guidelines that we have to follow are available on the EPA website. Good luck finding it, but I promise they are all there. We have an untreated negative control group that gets a water application, a positive control group that gets a label dose of an insecticide that has a similar mode of action as the test substance and we know it has an effect on bees, and then whatever rate or rates of the test substance. Each rate gets its own group. So, in a small study, you would be looking at three treatment groups: Untreated Control, Positive Control, and your Test Substance. Each one gets four replicates to make sure if we have one hive that swarms or is just pre-dispositioned to not be able to deal with tunnel stress, we have three replicates left for statistical stability. What this means overall is that a small tunnel study will have 12 tunnels minimum, with three treatment groups and four replicates per group.

Let's get into the basic labor part of this study. Each tunnel will be built with the dimensions of 20 feet wide by 200 feet long. It has to be in a field that has little to no pesticide application in the past two years, and be relatively flat and accessible, without being too accessible to outside traffic. Tunnels have to be 20 feet apart from each other, and we try to keep the spacing to around 50 feet between the treatment groups. For those of you who like math, that's 4,000ft^2 per tunnel, with 4000ft^2 between tunnels and on each side. For each treatment block, that's approximately 32,000ft^2 or 0.73 acres, and that's only if you get a consistent bloom across an area that big and can perfectly space everything. Usually, you'll have to move a tunnel or spacing to avoid a ditch, rock, bald spot, or bad growth area in the field and it will take a lot more space than that. To get the best spacing, it usually takes us about eight to 10 acres for a study with 15 or fewer tunnels.

When I say tunnels, I don't mean that we're digging trenches in the ground and creating subterranean bees. We are constructing what appears to be temporary greenhouses made of mesh over plastic hoops in the field. It usually takes two days to flag out the tunnel spacing and make sure everything is proportioned correctly. There's also rebar that goes in, or larger pipe has to be pounded into the ground to hold the ribs, which have to be cut to size and are made of a specific grade of PVC, and they have to be anchored and secured with wire rope. Linens go down the center of the tunnel and down each end (to catch dead bees for counting), which requires ground staples every seven feet on both sides and has to be cut to size. Four T-posts are used per tunnel to hold the anchor wire, and then the mesh has to be pulled over and fastened to the ribs. It's a pretty rough process and a lot of manual labor, but also a lot of construction and measuring skill.

In this same time frame, you have to be able to gauge when your crop will be flowering and know pretty well from the time of planting how long you have and when is the best time to start putting up tunnels. The bees have to go in with enough time to get a couple days of acclimation, and then seven to 10 days of exposure after application, and still have blossoms left for forage. The weather

Moving rebar around the field is easier with a four wheeler.

can make a huge impact on how this goes, because a drought can screw up your crop or cause a shortage of food, while rain can both delay your ability to build tunnels and speed up your crop. You also don't want it to rain within a certain time of application either, but you can only wait so long after the tunnels are built to put bees in. It can definitely be a complicated process.

Before the bees go in, they also have to be equalized as much as possible, which can also be about as easy as herding cats. We buy/build/use twice as many colonies as we need, then try our best to make sure that we have roughly the same amount of honey and pollen in all the hives, and enough eggs, open brood, and capped brood, and about the same number of adult bees (within a few thousand). After the hives are moved into the tunnels, we do a Colony Condition Assessment (CCA) on each of the hives to record the starting point, and we photograph the frames to mark the brood. We take photos of the brood for roughly 21 days to see if the brood that was present at the study initiation survives and at what percentage does it survive. This compares the survival of colonies that aren't treated to the positive control colonies and also to the test substance colonies. The stress of being confined to a tunnel can cause significant damage to the colonies already, so it can be difficult to tease apart how much damage is from the test substance without the presence of the positive control. It's also stressful for the bees to be photographed in the first place because you have to brush off all the adult bees without dislodging the brood.

When we do these studies, we're looking at specific endpoints to see if there is an effect. We observe the amount of foraging activity within the tunnels and compare it between treatments by counting the number of foragers within a square meter of a set period of time at three different locations within the tunnel. The linens on the ground catch dead bees that fall from the tunnel mesh and those bees are counted along with dead bee traps that are placed at the entrance of each hive. Pupae, larvae, and adults are differentiated on the paperwork. The assessments on the colony are done periodically to see what the overall change is among the colonies which includes a couple months after exposure to see what the recovery looks like, and the brood photography is completed over five sessions at specific time points.

These studies are designed to be a worst-case scenario with as much control as possible over the variables. As with any field setting, there's only so much you can control with weather, crop growth, and colony behavior. It's not uncommon to have a colony swarm within a day or two of being in a tunnel, just from the stress of confinement. If it rains too much, the exposure is lower than it should be, which also reduces the food intake and causes the colonies to start eating their brood. If they eat their brood, it may have nothing to do with the test substance and everything to do with the weather and confinement, but it makes the brood photography turn out pretty badly and there's nothing you can do. You may get a heat wave right when you start the study and only have a few hours of food availability before it hits 99° and the bees don't really fly and the flowers don't produce

Henry taking samples in a sampling funnel.

Working on brood photography.

Bobby demonstrating application for Charlie and Henry.

nectar. There are a lot of things that can happen in these studies and it can be incredibly frustrating.

When we do the applications, it also gives a lot of room for error. We are calculating a field spray and normally having to do some various conversions between volume and mass, metric and standard measurements, and calibration of nozzles and pass times and spray area. It can be very easy to make a small error on an application calculation that throws off the rate enough to cause problems. We also have custom built applicators with 18-foot boom sprayers that are designed for day use or night use with LED lights. However, rough terrain doesn't always work well and you might have to compensate for a PSI change if you can't keep the tank charged or don't account for enough overage.

In addition to these tunnels, we often take samples from within the tunnels and the colonies to determine residue levels. We can't really sample from the normal tunnels because we would be taking their food stores and opening them up a lot more. It would give too much of an effect on the colony health. That means we have to have at least one extra tunnel per treatment just for sampling. These are usually hives that are a lot larger because we put pollen traps on them and sample 300-600 foragers four to five times during the confinement period. In the tunnels, the pollen baskets are usually not as big as what you find normally, so the pollen traps don't always work. We may end up having to sample in-hive nectar and bee bread to compensate if we can't get enough from vacuuming foragers off the front (which the colonies just LOVE, which I guess you can imagine), plus we sample leaves and flowers to see how long the test substance stays on the plants and expose the bees. It is quite the process and never easy, but you can usually get a pretty good idea of what's happening from exposure. There's always some issues with testing, but that's how field work always goes! BC

Jessica Louque and her husband, Bobby run Louque Agricultural Enterprises, a contract research business specializing in apicultural studies.

A Sweet Opportunity For Business Growth

Todd **Harris**

It's not often that a person is able to merge their passion (beekeeping) with their profession (Crop Insurance). So, when I became aware last year of the new Crop Insurance program for beekeepers, I was immediately interested. Last year I spent a couple of weeks and months learning about the program and came to the conclusion that in most cases, it was a viable Risk Management tool that most beekeeper operations, big or small, can use to help manage their financial risk. Here is the program in a nutshell.

According to the USDA, honey bee colonies currently produce about 163 million pounds of honey in the United States. Just as important, is the pollination of many crops across our country. As you know, many things both manmade and natural can affect a colony's health as well as the bees' level of production in any given season. At the same time, the weather is unpredictable and can bring frost, hail, hurricanes, drought and freeze which can affect a crop's ability to produce buds, blossoms or even foliage in some years. As a result, weather can affect a colony's ability to forage and in turn, limit their ability to produce.

Insurance can provide a safety net to protect the income of beekeepers who raise and care for honey bees for the purpose of, but not limited to, the collection of pollen, honey, and wax production, and breeding stock.

Determining how to insure apiculture was no easy task. Our country has a vast variety of plants and crops, often with different species and each with its own seasons, light and water requirements and other climate conditions. A colony's production can be significantly affected by many of these factors as well. Due to this variability, rather than determining how much a particular colony produces, the Risk Management Agency's (RMA) Apiculture Pilot Insurance Program (API) insurance uses lack of rainfall in a specific area or areas called grid locations to determine when a loss payment is due.

Grid locations are approximately 17 miles square and are chosen by the beekeeper based on the location of apiaries or land that is owned or leased. Grids which cross international borders are not eligible for selection. The colonies do not need to physically remain within these locations to be insured, and all or just a few of the colonies can be insured. Beekeepers can only insure bee colonies that they own or have a share in the ownership and he/she cannot insure more colonies than he/she owns.

The grids used in the Rainfall Index Apiculture insurance are determined by the National Oceanic and Atmospheric Administration (NOAA), specifically the Climate Prediction Center (CPC) data. This data includes items such as how much precipitation is received, the temperature fluctuations within a day, snow cover, as well as atmosphere and oceanic conditions which can affect weather patterns. As a result, a long-term average for a specific area is generated as well as a timeframe.

How does it work? In addition to a grid area, the beekeeper selects at least two two-month periods during the year when rainfall is essential to the colonies, as well as the number of colonies that need to be insured. A coverage level is selected between 70 and 90 percent which helps determine the trigger point for a loss payment.

The last selection is a productivity factor which matches the amount of protection to the value of the production that best represents the operation and the productive capacity of the colonies. While not all of the colonies need to be insured, a beekeeper cannot insure more than the total number of colonies owned. By selecting a productivity factor, a value between 60 and 150 percent of the county base value is established, which is based on honey production and uses a five-year rolling average of USDA National Agricultural Statistics Service (NASS) data. The yield data is based on the NASS state average and the price is the national average honey price for a given year.

Final insurance payments are determined by using data from the National Oceanic and Atmospheric Administration Climate Prediction Center for the grid(s) and index interval(s) the beekeeper has chosen to insure. When the final grid index falls below the policy's Trigger Grid Index, an indemnity may be received. This insurance coverage is for a single peril, lack of precipitation.

How do I get paid? There is no action required by the beekeeper. A payout is generated when the amount of rainfall in a chosen grid area drops below a percentage of average, which was chosen at the time of application by

the beekeeper. Loss payments are sent automatically no more than 60 days after the final grid index is released which may occur before the premium is billed.

Rainfall Index Apiculture insurance does not require a historical record of a specific colony's production. And, since average rainfall patterns and historical averages are used, an onsite inspection by an adjuster is not needed. Remember, coverage is not based on rainfall on a specific farm, orchard, ranch or weather station. Similarly, coverage is not dependent on one colony"s lack of production, collapse or bee death.

How much does it cover and what is the cost? The Rainfall Index Apiculture insurance program provides more coverage than the Farm Service Agency's Noninsured Crop Disaster Assistance Program (FSA-NAP) program. Thanks to Federal government premium subsidies, the cost of insurance may be reduced by more than 50 percent.

How do I sign up? Insurance is offered within the 48 contiguous states and must be purchased by November 15. Premium is not billed until September 1 of the following year. Although the insurance is offered by the Federal government, specifically the USDA and the Risk Management Agency (RMA), private insurance companies work with trusted agents to administer the policies. We recommend that you sit down with a trusted insurance agent to review all of your options.

Some of the benefits of insuring your colonies through your crop insurance agent are:

- An easy to understand program
- USDA Risk Management Agency pays over half of the premiums based upon coverage level
- Qualifying colonies can be used for honey, pollination and breeding stock
- Ability to insure periods of the year that matter the most to your production cycle
- No insurance adjustments needed
- Historical production records are not needed
- API insurance provides more coverage than the Farm Service Agency NAP program

You will be asked by our crop insurance agent to make a few simple selections to establish values which represent your operation's specific risk factors. You and your agent will access the grid locator and decide which grids are right for you. Your agent will also use the Apiculture Decision Support Tool to view previous years' data and calculate what your indemnity might have been using similar elections compared to past data.

We recommend working with your crop insurance agent to view the decision tool, map, and historical indices for your area. It is important to review the historical indices for your area to make sure that this product is helpful to you since the Rainfall Index Apiculture policy does not measure your direct production or loss. For more information on the Rainfall Index Apiculture policy, see **ProAg.com/Apiculture** BC

Todd Harris is a ProAg Crop Insurance Agent and beekeeper. You can reach him at **tharris@harrisinsagency.com**.

Why Are My Top-Bar Combs CROOKED

Wyatt **Mangum**

Top-bar hive beekeepers need straight interchangeable combs in all hives, so they can manage colonies efficiently.

For example in routine colony management, a beekeeper may move capped (pupal) brood combs from a strong colony to a weak colony, providing it with a boost of young bees. To complete the swap, typically the same number of empty combs from the weak colony go back to the strong colony, giving it some growing space. The exchange of top-bar combs requires them to be straight and centered in the top bar (not lopsided). Beekeepers have a similar procedure for equalizing nonsurplus honey. Combs of honey from a heavy hive, a colony with too much honey, can be moved to another colony low on food. Empty combs go from the light-weight hive to the heavy hive, completing the exchange. Again the top-bar combs must be interchangeable.

Even with top-bar hives, specialized jobs can depend quite heavily on straight combs centered on their top bars. For example, the top-bar hive design is ideally suited for queen production by grafting. To mate the queens, I have special apiaries with a couple dozen small top-bar mating nucs. To start the mating nucs, I move top-bar combs (with brood, honey and bees) from established colonies and assemble them in hive bodies only one foot long (see Figure 1).

In frame hives, bees build straight combs from sheets of comb foundation. Usually comb foundation is not a part of top-bar beekeeping. For a substitute, beekeepers use wooden comb guides under the top bars. The comb guide could be a small strip of wood inserted into the center groove of the top bar. The wood strip projects out at a right angle (like popsicle sticks in the center groove). Another comb guide has the lower side of the top bar cut in a "V" running the length of the bar.

Perhaps it is not well known, but these comb guides are not new (see Figure 2). During past times (ca 1870's) when comb foundation was not generally accepted, not available, or too expensive, beekeepers used the wooden guides shown in Figure 2, and guess what? They had problems with crooked combs, similar to top-bar hive beekeepers of today. As an apicultural historian hearing about the current frustrations with crooked top-bar combs, I see the difficulty as a replay of the past.

Of course, comb foundation banished wooden comb guides and eliminated their problems of crooked combs. As Figure 3 reminds us, comb foundation literally dictates to the bees exactly where they must build the comb. Foundation forces the bees to build the combs straight. All that appears so obvious. Keeping numerous colonies in more than one hive design has helped me see different biological aspects about bees because the hive design itself can restrict some of the bees' behavior.

Comparing frame hives and top-bar hives, here is something I have observed that is fairly subtle. First off, comb foundation determines the location of the comb, which is obvious. Comb foundation does something else, which is not obvious. Comb foundation seems to keep the honey bands (at the top of the comb) from bulging out too wide. That bulge can cause an "abnormal" shift in the placement of subsequent combs. Looking back at Figure 3, on the side of the tilted comb that the bees were building out, the length of the cells, particularly near the top (the future honey band), is influenced by the adjacent foundation sheet. Even if the bees are not building out that foundation sheet yet, it still seems to influence the length of the adjacent growing cells.

Of course we have a feel for that. Using nine frames versus 10 frames in a super changes the thickness of the honeycombs. With nine frames, the honeycombs can grow thicker, and they are easier to uncap. In a super, the beekeeper has already determined the *location* of the combs by spacing the nine frames (usually with drawn comb). The comb thickness has been determined too,

Figure 1 *Assembling combs for top-bar hive mating nucs on the tailgate of my bee truck. These are one-foot long hive bodies partitioned in the middle (arrows). A pair of mating nucs is in each hive body, six total on the tailgate. The efficiency of my nuc assembly depends on combs that fit any top-bar hive body.*

Figure 2 *Rare Survivors: frames over a century old with wooden comb guides. One frame has the wood strip projecting from the center groove of the top bar. The other frame has the "V," once called a "triangular comb guide."*

Figure 3 *Comb built from foundation. Beekeepers designed the frame hive with foundation for honey production. The hive design may inadvertently suppress some bee behavior, particularly with comb construction.*

provided the bees completely fill the super and the combs bulge out until only a single bee space remains between the capped honeycombs.

With wooden comb guides, the top-bar hive situation is more complicated. Both variables, the location of the combs and their thickness, can be determined by the bees (not the beekeeper). The wooden comb guides do not prevent the honey band from becoming thick and bulging wide at the top of the comb. The bulge is mostly into the empty space for the next comb. That lopsided bulge of a growing comb affects the placement of that next comb. In turn that comb, shifted over a bit, shifts the placement of subsequent combs as the colony builds the sequential combs filling the hive. Numerous times, I have heard top-bar beekeepers say their brood combs were fine but the bees crossed up the honeycombs. With this observation in mind, let's watch how crooked combs can occur with a special top-bar hive; at least this is one way the combs can become crooked.

In my bee house, I study honey bee behavior with various observation top-bar hives. For this comb placement demonstration, I used a four-sided glass top-bar hive. The colony for this hive began as a homemade package (see Figure 4). I shook the bees into the glass hive, and the colony grew as a typical top-bar colony (see Figure 5). Initially, the bees built a few brood-nest combs, roughly at the same time. Later on, the bees constructed a sequence of honeycombs into the remaining volume of the hive from left to right (see Figure 6).

When the colony constructed the first group of brood combs, the extra thick right-lopsided bulge was present, but slightly. Obviously for additional honeycombs built sequentially, the bees cannot bulge the newest comb back into the (left) previously built one. So naturally, the bees bulged new combs into the open space on the right. Figure 7 shows that shift with a close-up through the glass at the very top corner of the hive where the "V" comb guides end–a revealing location. Nothing obstructed

Figure 4 *A top-bar hive with glass on four sides for better viewing. I built this hive in the late 1980s. The bee package for the demonstration is to the lower right.*

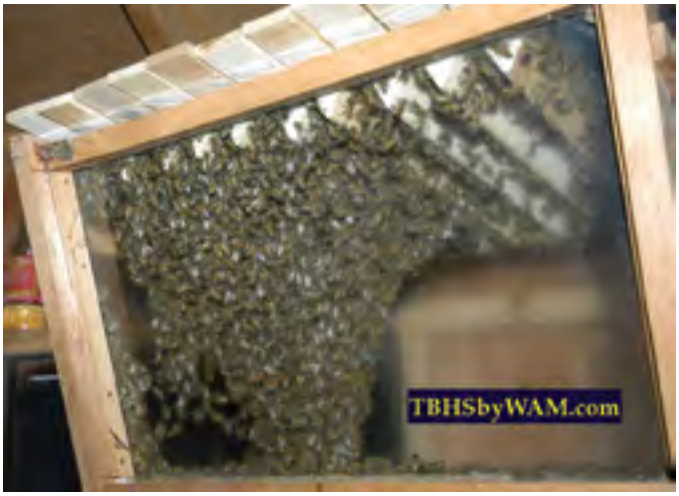

Figure 5 *The bees hived in the glass top-bar hive. The queen cage hung from the top bars, which determined the initial location of the colony. I put an open-top feeder on the right side of the hive to give the bees plenty of syrup to support their comb construction. I removed the feeder when the bees could forage for themselves. The entrance is through the hive floor.*

the bees from bulging the honey band on the right (like a strip of comb foundation hanging from the next top bar).

As the colony constructed more combs, the lopsided comb distortion tended to increase (see Figure 8 and compare it to Figure 7). Seeing all the combs together, Figure 9 shows the lopsided comb distortion tending to increase as the colony's combs filled the empty space of the hive to the right. Moving to the right, the growth direction of the colony, the combs tended to become more lopsided with the thick side on the right. The center of the comb should have been directly under the tip of the "V," as indicated by the black arrows in Figure 9.

If the glass hive were longer, the honeycombs would eventually cross between top bars, thus reproducing the observations of top-bar beekeepers, who reported no problem with the brood combs, but their honeycombs were crossed up and connected to more than one top bar. However, now we understand the problem actually began in the brood nest, and increased as the bees built more honeycombs, until the combs became so crooked they crossed between top bars.

In addition, lopsided combs can be mostly straight on their top bars. Yet the combs may not be interchangeable with combs from other top-bar hives. In fact, the combs may not be interchangeable within its original hive. For a badly lopsided comb, it cannot be turned around and placed next to another lopsided comb, bringing the two thick sides together. They may not fit in the hive because the extra thick lopsided honeycombs crush together. Or if less than one bee space remained between the combs, the bees would not tolerate that gap (too narrow). They would chew the narrow gap wider to at least one bee space. While the bees chewed open the narrow gap, small hive beetles could use the narrow gap as a place to reproduce. (Bees allow a minimum of *one* bee space between honeycombs. Brood combs have *two* bee spaces between the combs, allowing the nurse bees to work back-to-back.)

Here is another way, a typical way, for combs to become crooked and connect adjacent top bars.

Comb construction begins at the middle of the top bar and proceeds to the ends. In the middle of the top bar, bees build comb relatively quickly compared to finishing the comb at the ends of the bar. So for an older longer comb (reaching the ends of the bar) next to a younger shorter comb (not reaching the ends of the bar), the bees can lengthen the honey cells in the corners of the older comb. Those longer honey cells can crowd into the space for the ends of the younger comb. When the bees lengthen the younger comb towards the ends of the top bar, they must curve the ends of the younger comb to keep a bee space between the two combs (older and younger). Similar to the situation above, near the brood nest the combs curve just a little on their ends. The curving usually increases with successive combs until the attachment of the combs appears as a "C" for difficult cases (but the middle of the "C" could be straighter). The ends of the "C" would be where the honeycombs curved so much they attached to adjacent top bars, a big mess (see Figures 10 and 11).

I have seen two attempts at correcting the above comb misalignments. The first has wider top bars for honeycombs, trying to accommodate its thick honey bands. Other top bars are made narrow for brood combs. Beekeepers, especially top-bar beekeepers, have all kinds ways to keep bees. No doubt, some beekeepers can make this technique work. With two different top-bar widths, beware of a fundamental violation.

I have kept bees for over 50 years. In high school, I had 125 frame hives. I made honey by the ton with *three* different size frames. At times the different frame sizes restricted colony management. Critical movements of brood and honey among hives could not occur. Why? Trying to swap frames that would not fit in the other hive body. Having two different widths of top bars feels like the beginning of this old problem again.

Figure 6 *The growing top-bar colony. The bees appear to follow the lower edge of the "V" comb guides. However, the combs could be lopsided from the older (larger) combs bulging into the space for the newer (smaller) combs.*

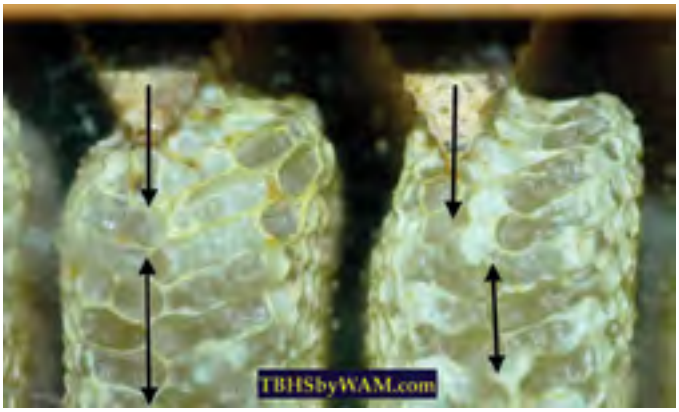

Figure 7 *The right-lopsided distortions of two combs near the initial brood nest. For a comb, the reference point is the tip of the "V." The midrib of the comb should begin there. The cell walls should be the same length on either side of the "V." At this end, when the left comb grew, the end of the right comb was not present. Consequently, the cell lengths on the right side of the older (left) comb extended into the space of the younger (right) comb. The bees may have tried to compensate by right-shifting the midrib of the younger (right) comb. The lower double-headed arrows mark the estimated location of the midrib. The left comb seems matched with its comb guide while the younger comb was right shifted. (The midrib consists of the cell floors, or the "foundation" part of the comb.)*

Figure 8 *An extreme lopsided distortion further from the colony's starting place, the initial brood nest. The older (left) comb bulges deeply into space for the younger (right) comb. No matter the distortion, the minimum spacing between honeycombs is one bee space. Including that gap, the left side of the right comb has hardly any space for cell length. As the lopsided distortion increases, the bees cannot begin the comb near the tip of the "V." Consequently, combs begin crossing among the top bars. The orange arrows give the approximate curving midrib location as the bees try to right shift the combs.*

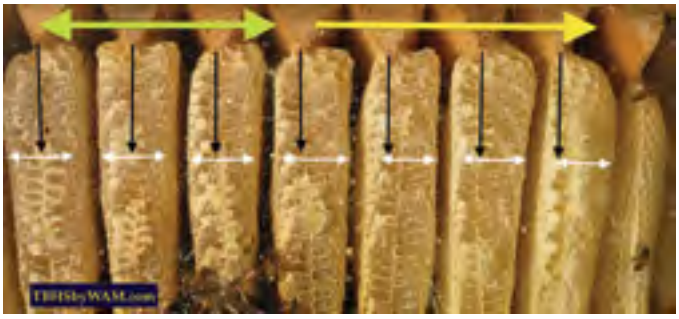

Figure 9 *Crooked combs: an increasing effect. This view is like we have "zoomed out" from the close ups of Figures 7 and 8. The big green double-headed arrow shows roughly the initial brood nest combs. The large yellow arrow points to the direction of sequential comb growth. The black arrows pointing down from the "V" tips tell where the center of the combs, the mid ribs, should be. The white horizontal arrows measure the comb width. Both sets of arrows indicate the amount of asymmetric comb growth (lopsidedness) from very little on the left to a large distortion on the right.*

Here is the future problem. Soon or later, during Fall management after a poor honey season, the wider honeycomb top bars will be needed to feed colonies. Wide honeycomb top bars will become mixed up with narrow brood-comb top bars. Different hives would have various mixtures of wide versus narrow top bars. Some hives might contain more combs than others, which would bound to be a problem at some point. I think it would be better to find a way where all the top bars would remain the same width, rather than have different top bar widths.

Another method I have seen has smaller spacer sticks next to the top bars expected to become the honeycombs, which would be ones away from the entrance. This plan has the advantage of keeping the top bars with only one width. Both of the counter measures rely on the hive implement as invoking a solution. Why not let the beekeeper become part of the solution?

Right after the colony finishes its first group of brood combs and begins expanding into the remaining part of the hive, inspect the colony and try turning around the top bars with new combs. The goal here is to cancel out the lopsided comb while the bees are elongating the cells. Open the hive from the rear (away from the entrances) to avoid disturbing the brood nest, unless it needs an inspection. With this method, one has more opportunities to learn about comb construction.

For myself, I use a strip of foundation (1½ inches wide, 3.81cm) securely waxed into the center groove of a top bar. In a top-bar hive, the foundation strips function like the top of the sheets in a frame hive, to prevent the bees from bulging the combs. Typically, I wax strips into some 700 top bars in an afternoon. When the bees build that much comb, I cannot have a crooked comb problem. I need a reliable method for getting straight combs.

As with any method, beekeepers have voiced concerns when I give presentations of top-bar beekeeping. Here are a couple of the most frequent comments. With comb foundation, there could be wax contamination from miticides. True. However, the amount of wax has been greatly reduced. One deep brood frame foundation sheet

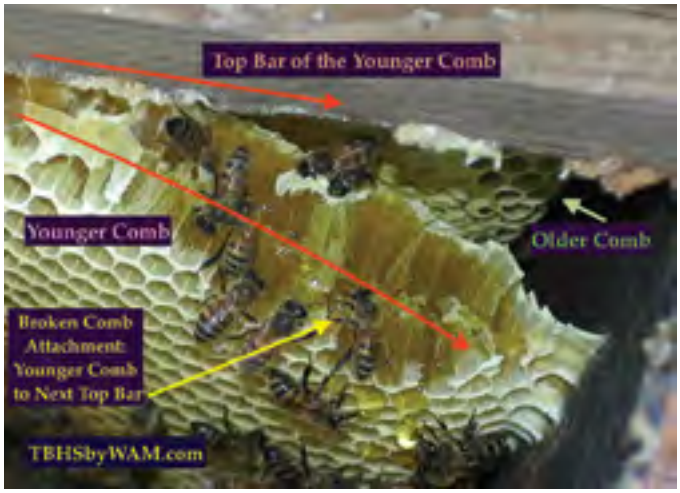

Figure 10 *A top bar and the end of its comb curving away. The comb should have remained attached and straight to the top bar across the top of the picture. But No! The bees curved the comb and attached it to the top bar that I have already removed, breaking the attachment as seen. The long orange arrows show the divergence of the comb from its top bar. The end of the comb under the top bar (green arrow) comes from the older adjacent comb behind the younger comb. The end of the older comb curved into the space for the younger comb, forcing its end away from its top bar as seen.*

cuts into seven or eight top-bar strips.). Whenever I cut a honeycomb from its top bar for consumption, I leave the strip of comb that includes the original wax foundation strip.

Figure 11 *A "C" shaped top-bar hive comb as seen from above. This view expands Figure 10, which was a close up of the upper right corner of the comb, so marked. Now we see both ends of the younger comb curve away from the bulging corners of the older comb behind it. The middle of the younger comb is roughly straight. However, the excessive bulge in the middle of its honey band produced a badly lopsided comb. The yellow and orange arrows show the amount of comb bulging that would invade the space for the next comb (plus one bee space). Thus, the younger comb will distort the placement of the next comb, and so on, until numerous combs become crossed up on several top bars.*

Another concern is the foundation strips are subject to breakage. True. However, the strips need not be perfectly straight with no breaks. If a few strips have broken-out places, just put them between other strips in better condition. And do not fret over bent strips. I straighten them out some, and the bees do the rest. Brood foundation (always unwired for cutting) is the strongest, but it has fewer sheets per pound. The thinner, more delicate foundation for cut comb honey or section comb honey (where the comb is consumed) has more sheets per pound, but it is easier to break. (For more details in the procedure, see my book at **TBHSbyWAM.com**.)

Understanding why bees build crooked top-bar combs is a step towards finding ways for bees to produce straight combs. With straight combs, top-bar beekeeping is an elegant and thoughtful way to keep bees. BC

Acknowledgments

The author thanks Suzanne Sumner for her comments on the manuscript.

*Visit **TBHSbyWAM.com***

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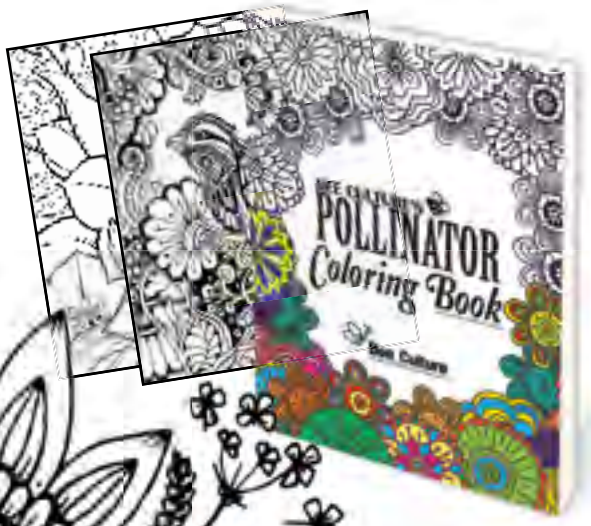

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Letters From Behind Bars

Jennifer **Berry**

Several years ago, I wrote an article about the first class to became certified beekeepers in a maximum security prison through our Georgia Master Beekeeper Program. Since that time, four additional prisons have added beekeeping programs with another one the way. To date over seventy inmates have become certified beekeepers behind bars. Our job has been to assist with the program and personally administer the Georgia Master Beekeeper exams once the students had completed the program. So far, every student that has taken the exam has not only passed but has passed with flying colors. The average score for the inmates is well into the 90% range. Yes, I know, they have ample time to study however they are extremely committed, so much so, several of the students had to learn to read in order to take the exam.

The Georgia Master Beekeeper Program is an intensive four-step program designed to educate students about all things dealing with bees and beekeeping. It allows participants to not only increase their knowledge but to hopefully take that knowledge and teach others about beekeeping and the importance of pollinators. The four levels of beekeeper certification are Certified, Journeyman, Master and Master Craftsman.

This past June, I and Westley Hestler, (UGA lab technician), traveled to Lee Arrendale State Prison (all women's facility) to administer the Georgia Master Beekeeper examination. By the end of the day we added seven more qualified certified beekeepers to our roster. But even more impressive was the addition of the five women into the Journeyman rank. We are very proud of all the students that have passed the various levels in our Master Beekeeper Program, but have been exceptionally proud of those that have done so behind bars. As you can imagine this is not an easy task given the situation and the inability to access information.

A few weeks after the exam at Arrendale, I received a packet of letters. After reading each one, I wanted to share them with you (with their permission of course). These are the letters from the five ladies that have become the first Journeyman Beekeepers behind bars.

Ladrina Johnson,
Journeyman Beekeeper

I cannot begin to explain how beekeeping has changed my life and has helped me to know myself in ways that 23 years of life had yet to do. Learning the life cycle and overall ways of the honey bee has given me a new perspective on my life. Loyalty, sacrifice, one's anatomy and genetics are all things that make up a good colony, thus they make up a good life. As poetic and cliché as that sounds, it's the God's honest truth. I love beekeeping, and all that it has given me over the past two and a half years.

Julia Mahood pushed me and was patient with me. She also encouraged and helped me to believe that I not only could do this and go all the way through the certification levels, but that I was actually good at it. It always feels good to be good at something, and my *something* lies in the honey bee.

My experience does not stop here at Lee Arrendale. If I don't take anything else away from this 15 year hostage situation ;-) –wink!— it will definitely be my love of, and knack for beekeeping, and the knowledge that I've gained and want to spread. The honey bee and all pollinators are so vital to our existence and it is pertinent that more people not just know, but love and understand them, as I myself have grown to love and understand them. #fortheloveofhoney

April Ulrich,
Journeyman Beekeeper

The 2016 new year Beekeeping Class sign-up sheet, that appeared on my dorm wall might as well have leaped at me, grabbed my shoulders, and shook my body as nothing else in my decades of incarceration has done. Even more earthshaking took place when I was accepted from the hundreds that applied for this brand-new vocational class.

I'm bee-dazzled, you might say. Upon opening our beginner class book *First Lessons In Beekeeping,* I read the words describing beekeeping as an art and science. I have always loved nature and art as well as

Ladrina

April

creative problem-solving. I love the outdoors, especially in warm weather. I notice not long after the winter solstice how the sunlight lasts longer and I can't help but romanticize honeybees doing the same. I'm sure we are kindred spirits even if honey is not my preferred diet.

How do I count the boring days of prison life? They seem to go by much faster since working with honey bees. After a third Summer of beekeeping, I've witnessed a great variation of behavior in these insects that an uninitiated would just term a "busy bee". They differ greatly between individuals and colonies. I like seeing new students learn one thing and then the bees showing them something different.

I loved a variety of insects as a child, but had never watched a colony of honey bees. From documentaries, I knew of the "dance language" and hive use in great numbers in commercial pollination. I've learned so much about bee behavior in their hive box and I'm eager to keep learning.

Sonya Bamberg,
Journeyman Beekeeper

Thank you so much for taking the time to come and personally administer our beekeeping exams. I can't begin to tell you how important your efforts on our behalf are to us, or how truly grateful we are!

People often ask me what bee and barbed wire have in common. Here at LASP the barbed wire fence encloses more than just a prison; within this fence, is also an apiary. Our apiary now consists of ten hives, each home to a colony of honey bees. Tens of thousands of little bees, that first came to us in April of 2016. I was one of the lucky few chosen to participate in the very first beekeeping class inside a State of Georgia Women's Prison.

Sonya

In prison, classes teaching marketable skills (auto paint and body, auto mechanic, woodworking welding, small engine repair, etc.) are normally reserved for young inmates who will be going home soon. It's very hard for someone with a long sentence to get into vocational classes. However, this beekeeping class was going to be an ongoing endeavor, so they needed a few "long timers" to learn, to become certified, and to teach future students.

I am a 62-year-old, great-grandmother. I was thrilled to be chosen and excited that our first bees would arrive soon. I knew absolutely nothing about bees! Grandma was going to learn a new skill. We were taught by Julia Mahood and Virginia Webb-two gifted Master beekeepers who donated their time to share with us the delightful and curious way of honeybees. There is so much to learn: species, families, long Latin names, and the special characteristics that make each different species unique. Then there are the individual bees themselves. They are truly one of God's most amazing creations.

I am most impressed by the workers. They are the smallest, yet God has given them the task of pollinating the flowers and increasing the harvests that feed the ever-increasing population of our world. Their hairy little bodies are designed to be the perfect method of transporting pollen from one flower to another. Their work is organized and efficient and their products are healthy and nutritious: honey, wax, pollen, royal jelly, and propolis.

I am now a Journeyman Beekeeper with a much greater appreciation for one of God's marvelously complex creatures. I have learned much about the world of the honey bee, and I'm sharing what I have learned with family friends, and new beekeepers. I am also beginning work on the next level of certification – the Master Beekeeper. When I return to the outside world, I will be a beekeeping grandma, with a new skill to share with my grandsons and a productive, healthy new way of life. Because of the beekeeping classes here at LASP, I now have a way to contribute to our community in a positive meaningful way.

Miryame Diouf,
Journeyman Beekeeper

You know those people who are deathly afraid of bees and start running in the opposite direction as soon as they hear that buzzing sound? The ones who try to kill every bee they see for fear of being stung? Or how about the people who start to shake as soon as a bee comes flying up? I know these people

Miryame

because I once was all of these people. You couldn't have convinced me two years ago that I was going to be a beekeeper, or that I would willingly go outside in a bee suit in the midst of thousands of bees. If anybody would have told me that that, I would have insisted that they see a psychiatrist immediately! Me? A beekeeper? No way.

Yet, here I am today happy to say that I am now a Journeyman beekeeper and plan to be a Master beekeeper. I started beekeeping because I was tired of being a slave to my fear – because of my fear of the unknown. Once I understood bees and learned about the different kinds of bees, I was able to ground myself and control my fears.

Beekeeping has also helped my attitude. You can't be an angry beekeeper. You have to work through your problems and the gentleness and efficiency of the honey bees does a lot to calm one's nerves. I remember when I first went out on that yard in my beekeeping suit. Out of the group of students, I was the only one standing as far away from the hives as I could and I refused to work the bees. Now I work them, I hold bees in my hand, I can mark queens, I can be submerged in bees and not panic.

The experience of beekeeping has been an amazing one and I wouldn't trade it for the world. I thank Ms. Mahood for her first beekeeping presentation here because from that moment on I was ensnared in the ever-changing, ever-evolving, extraordinary world of honey bees.

Tracy Fortson,
Journeyman Beekeeper

What Beekeeping Means to Me…

Beekeeping means that, while in the apiary, I can be in my own little world. I can

leave the razor wire and locked doors of prison behind. I can be free for just a little while.

I have always had a love for animals of all kinds, including insects. As a child, I could be found, jar in hand, exploring the surrounding wooded areas of our home, as well as underneath rocks, logs and crevices for bugs and spiders. I was amazed at all of the activity going on there that most people rarely noticed. Insects fascinated me then and the fascination has never left me.

My name is Tracy Fortson and prison has been my temporary home for 18 years. Although prison is not where I would like to be, while I am here, I have made it my goal to make the most of the opportunities available to me. Little did I know that beekeeping would become one of those opportunities.

In March 2016, I learned that Lee Arrendale State Prison had decided to begin a Beekeeping program on the inside. It was as if the door to a brand-new world opened before me. I knew, of all the programs available inside, this was "The One" created especially for me. When the sign-up sheet to attend a beekeeping presentation went up, I wanted my name to be first on the list. At the presentation, I sat on the front row just to make sure I could see and hear everything!

Once I learned that I was one of the 25 students chosen to participate in the first beekeeping class inside a women's facility, I was elated! This was going to be great! After the first class, all I could talk about was honey bees! I went to bed talking about honey bees and woke up talking about them every morning. Honestly, I probably talked about them in my sleep. I was learning so much! The more I learned, the more I wanted to learn and the more I wanted to share what I had learned with other people. The more I shared, the more other people began to become interested. Of course, some just could not grasp the concept of working with bees and the happiness it brought to my life. Honey bees sting! Yes, they do! Nevertheless, there is so much more to them than that little stinging apparatus on their posterior!

Tracy

One of many hives behind bars at the women's prison.

I thought I knew a lot about insects and bees, but being in this program and working with honey bees has changed my entire perspective. Like most people, I have always loved honey, but I never really thought of what it took to make it. As humans, we tend to take many things for granted. Now that I know how much work it takes to make just one spoon of honey, I have a new respect and a new love for the honey bee.

Although I am now a Journeyman beekeeper (two years of beekeeping), the fascination with honey bees continues to grow. I can hardly wait to get home and have bees of my own, but while I am here, I will work toward my Master Beekeeper certification and continue to educate others about the importance of our pollinators. Being a beekeeper not only gives me the opportunity to contribute to my community and environment, it allows me a taste of honey and freedom inside.

What I gleaned from these letters is how beekeeping has been a life changer for these five women. Not only being able to escape the prison walls for minutes each week, but becoming certified and journeyman beekeepers, and accomplishing something they themselves believed they couldn't. In the beginning, they were doubtful of their abilities to pass these exams; but with the support and encouragement of several volunteers (Julia Mahood and Virginia Webb), a lot of hard work and studying, they realized that not only were they capable of becoming a certified beekeeper, they were competent enough to continue the journey. It still amazes me all the many ways honey bees help us humans!

One thing I've learned since my involvement with these imprisoned beekeepers, they are just like you and me. They have hopes and dreams, smiles to share and stories to tell. It's been a pleasure meeting and working with them these last years. Hopefully one day, when they become our neighbors, they will continue this beekeeping journey on this side of the fence.

Next month, I would like to highlight the volunteers that are making this all happen, Julia Mahood, Rick Moore, Brutz English, Virginia Webb, Broadus Williams and Bear Kelley. These are the ones who have taken countless hours of their time and tirelessly driven to the prisons to educate individuals who have little to no opportunity to learn about bees. Thank God for each of them.

Take care of you and the bees! BC

Jennifer Berry is the Research Leader at the University of GA Bee Lab in Athens.

Organize A Black Jar Honey Contest

Suzy **Spencer**

What is a "black jar" honey contest? In a normal, standard honey contest, the moisture percentage, fill-level of three jars, clarity, foam, particles, and other things are judged with a goal of perfection and consistency. The taste is not considered unless there is a defect present (like fermentation, residual chemicals, or metal contamination) in which case points are deducted from the score.

However, in a black jar contest, all that matters is how good the honey tastes to the judges. Many people like the simplicity of that. Honey containers are covered so the judges cannot see the visual characteristics or what's in the honey (i.e., "black jar"). Sometimes the entrants are allowed to cover or decorate their jars in any way they wish, but this can result in judging bias. Sometimes the containers and lids are standardized then covered the same after submitted so the entries are completely indistinguishable from each other.

The North Carolina State Beekeepers Association (NCSBA) has two annual conferences – in spring (early March) and Summer. At the Summer conferences, we have the standard honey-related contests with specific criteria for judging. For a change of pace, we held our first black jar honey contest at the 2018 Spring conference with the intention of maximizing involvement of our attendees in a fun competition.

Other black jar contests for which I could find information involved no more than three or four official judges, which meant the winner was chosen based on the taste preferences of only a few people. I wanted it to be a true "people's choice" contest, allowing as many judges as possible to participate. The potential logistics were daunting because we could not predict how many entries we would get or how many people would want to judge.

The purpose of this article is to explain step-by-step and in detail how this can be done in an organized way at a big event involving a large number of entries and judges. To summarize, we had:

a) 43 entries and 116 different judges, which was 20% of the total number of attendees at the conference (584). This procedure, which splits the entries into judging ranges, can easily accommodate fewer or more entries or judges. The number of judges is practically unlimited. However, around 75 entries is probably the maximum due to limits on how many entries a judge can reasonably taste during a given time period. Another draw-back is that not all judges can taste all the entries in the preliminary round when there are a lot of entries.

b) two voting rounds (preliminary and final). There would not be a need for a preliminary round if you have ewer than 15 entries.

c) poker chips to cast votes for 1st (blue, three points), 2nd

(red, two points) and 3rd (white, one point) places, with the winner determined by total accumulated points.

d) 2.5 days in which to structure the contest. It can be done in a shorter time-period with proper pre-planning and notification and good on-site communication with entrants and potential judges.

e) clear rules and forms to make things flow easier and keep everything organized and documented. For your consideration and assistance in planning your own event, the rules and forms mentioned in this article are available to anyone as posted on the NCSBA website at **https://www.ncbeekeepers.org/members-only/contest-and-awards-mo/black-jar-honey-contest**. Having these in hand for reference as you read through the following steps may be helpful.

Here's how we did it.

1. **Develop the contest rules and make them widely-available before the event**. The notice and link to the rules was emailed to our 79 Chapters, announced in the NCSBA quarterly newsletter (the *NC Bee Buzz*), and posted on the NCSBA 2018 Spring conference webpage. The rules were subject to change to provide some wiggle room. For example, we did not say there could be only one entry per person until someone showed up with three. One thing you cannot change later is the container requirements for the entry, so be very clear about that. We required flip-top lids and plastic containers so the honey could be squeezed out during the judging rather than removing the lids. This also meant that only one tasting-spoon would be needed for each judge. Most black jar contests require a 1-lb entry, but our minimum was 12-oz. This was plenty for our format and the number of judges we had. Most "tastings" involve less than ¼ teaspoon of honey, although some judges will want to re-taste before casting their votes. The use of small tasting spoons will help with portion control.
2. **Reserve areas at the conference for signing in the entries and for judging.** The registration area is convenient for signing them in. For judging, you need enough tables to accommodate all entries spread out to give judges elbow-room and one for refreshments for palate-cleansing between tastings. How many entries do you anticipate? Be prepared for whatever happens.
3. **Decide how much time to devote to each of the two judging rounds** (preliminary and final) and how to break it up, for example, 9:30 am - 12:30 pm for the preliminary and 2-5 pm for the final if on the same day. Working fast, you will still need at least 1.5 hr between the rounds to count votes and prepare for the final round – believe me.
4. **Put details about the contest in the on-line and printed program.** Say where and when to drop off entries, the times and room where the judging will take, when the winners will be announced, and where to reclaim entries. If you will not know locations until the event, put "check at the registration desk" and later post it there. Good communication is required to make sure there are no misunderstandings and everyone stays happy. This event, afterall, is supposed to be fun.
5. **Identify volunteers** who will help sign-in the entries, sign-in the judges, cover and mark the entries and extra voting-jars, count the votes, and help in other ways with the event. Have a backup plan.

Get as many entries, and judges as you can (but be very organized).

6. **Assemble supplies** and do what you can before the event. Cover the voting jars, for example. Print the informational signs and sign-in sheets. Prepare the templates for the judges' handouts so all you have to do is fill in the official entry numbers and copy them on-site.
7. **Put up informational/direction signs at the event before registration opens.** Examples: "Sign in honey entries here", "Final contest rules", "Be a contest judge". Be sure to post the day, time, and room number for both rounds of judging and encourage people to come to both. We created text in word using 8.5 x 11" and 11 x 17" templates (sizes very inexpensive to print), with enough margins so the sheets could be cut down and spray-mounted onto standard size foam core (8x10" and 11x14"). The signs were propped on table display stands (available from big-box craft stores) and easels. This was very inexpensive to do.
8. **Sign in and receive the honey entries.** A clipboard helps keep sheets together. Include the entrant's name, signature, membership number (if you have these), county where honey was produced, the probable nectar source (optional), and space to add the official entry number (to be assigned later). We did not want to assign the official entry number to correspond with the order of when they dropped off their honey to avoid a possible bias, although this would be a simplified option. A volunteer must make sure the entry is labeled with the entrant's name (anywhere except on the lid) and is in an appropriate container (not too big or different from the others). Entrants were allowed to transfer their honey into another container if theirs were inappropriate; we provided containers and lids for purchase. We also had extra yellow, drip-less lids to switch out some that were variously colored or already leaking to further standardize the entries and make them more neat and anonymous. We absorbed that cost because it was not a stated-requirement in the rules.
9. **Place the entries in a wheeled container** to get them out of the receiving area after check-in, for safe-guarding, and for easier transport. A wheeled cooler works great for this.
10. **Assign an official entry number to each entry**. We drew numbers from a hat. Write the official entry number on the sign-in sheet and guard this sheet: it is the key to the identities of the entries. Neatly label the lid of each honey with its official entry number using a permanent marker and white artist's tape or other easily-removed tape.
11. **Determine the number of judging "ranges" needed**

based on the final number of entries and assign each a letter. A judge should not be asked to taste more than 12-15 honeys. Less is better. We had 43 entries and ended up with four ranges (A through D) of 10-11 entries each. In order to have no more than 12-15 honeys in the final-round, you should have no more than four or five ranges in the preliminary-round, even if you have to exceed 12 honeys per range.

12. **Cover each of the entries with aluminum foil** so that only the number on the lid is showing and the flip-top can be opened. You can use other coverings, but foil is quick, easy, and inexpensive.
13. **Prepare a correspondingly-numbered, covered voting-jar for each numbered, covered entry**. To avoid bias, cover these so judges cannot see how many chips have been placed in the voting-jar by earlier judges. Prepare as many as possible prior to the event to save time at this step. Since you can't predict how many entries there will be, you have to guess. If you overestimate, all you've lost is a few sheets of covering material, but you'll be glad you had most of these done when you become busy with covering entries and finalizing the forms at the event. Pint-size canning jars and rings worked for us. Instead of metal lids, circles were cut from very stiff paper and a slit was cut into each circle (with an exacto-knife) big enough for a poker chip to fit through. We made a template of 12 per sheet and made copies at a copy center. We covered our voting-jars with black construction paper (9 x 12" cut to 6.5 x 12") so that only the ring/lid was visible. Use a white paint marker (like for marking queens) to add a big, neat number to the front of the voting jar that corresponds with the number on the entry.
14. **Complete the vote-tracking form (one sheet for each range)** by adding the official entry numbers in numerical order. You will use these same sheets for tallying the votes for both the preliminary and final rounds although only three from each range in the preliminary will make it into the final.
15. **Prepare the preliminary-round handout for the judges** (with instructions, list of entries in each range, and room to take notes as they taste). The instructions at the top can be prepared ahead of time, but you cannot finalize this form until you know the number of entries in each range. After you fill in the entry numbers in numerical order, you need access to a copier on-site to make copies. The judge keeps this sheet (it is not turned in), so make a copy for each judge.
16. **Set out the entries with their correspondingly-numbered voting-jars on the tables in the voting room** in order of official entry number (i.e., the order on the judges' handout). The judges are told they can taste in any order as long as they taste all in their assigned range before voting.
17. **Set out non-carbonated water, cups, and unflavored soda crackers for refreshing the palates of judges**. Have paper towels on-hand to clean up drips as needed.
18. **Open the preliminary-round voting and start signing in judges** at the designated time. We made announcements at each break in our conference program to encourage participation. Assign each person a specific range to judge in rotating order as they arrive. The judges' sign-in sheet should include the name, membership number, and range assigned. Give each judge a handout/instructions with their assigned range circled, a tasting spoon, napkin, and one each of the following for casting their votes: blue poker chip (for 1st place), red chip (for 2nd place), and white chip (for 3rd place). We used the small silver plastic spoons that hold around ½ teaspoon, available in big-box grocery stores in the aisle where other plastic tableware is sold. Have extra pencils or pens available for taking notes. How many judges do you anticipate having? Be prepared so you'll have enough of each of these items. We ended up with 15 judges for each of the four ranges. This was actually 52 different people (not 60) because four returned to vote in additional ranges. These four had to sign in again and be assigned to a different range. We had three parents ask if their children could judge. We agreed but emphasized that it was to be taken seriously under the parents' supervision. In hindsight, we realized children just wanted to taste the honeys, not necessarily to vote, so they may be satisfied with just tasting. An alternative is to mark childrens' chips with tape or other method so you will be able to remove their chips from the official votes later or to identify a "childrens' choice" winner. It would also be interesting to see what honeys appeal to children more than to adults and identify why, but we did not do that.
19. **Close the preliminary-round judging at the designated time and tally the votes** to determine the top three entries in each range. Allow enough time to count each color of chip with at least two volunteers. Have a calculator available. Enter the numbers on the vote-tracking form and calculate the total points for each entry: blue chip = three points, red chip = two points, and white chip = one point. Have a plan to resolve any ties. Remove all chips from the voting-jars. Remove from the tables the entries (and their corresponding voting-jars) that do not make it into the final-round.
20. **Prepare the final-round handout for the judges and make copies.** This is similar to the preliminary round handout but will list only the top three winners from each range. These should be in order of the official entry number.
21. **Open the final-round voting and start signing in judges** at the designated time. Follow the same format as for the preliminary-round. We had 89 people judge the final-round. Of these, 25 had voted in the preliminary round and 64 were "new to the party".
22. **Close the final-round judging at the designated time and tally the votes** as before to determine the top three entries. Because not all judges in the preliminary round tasted all honeys, we could not say that these 12 final-round honeys were the top 12 entered into the contest. That is also why we could later rank only the top three honeys, not the 4th through 12th place finishers. A disproportionate number of the best-tasting entries could have been in one range due to the random entry-number assignments. Think about this and you will understand what I mean.
23. **Remove the covering from the entries to expose the entrants names so they can be reclaimed**

easily. Set them out on a table in the designated area for an honor-system pickup. It was obvious which ones did not make it out of the preliminary-round because of how much honey was left in the containers. Those that made it into the final-round had 7+ times as much gone. The amount remaining will depend on the number of judges in each round and how much they re-tasted before voting.

24. **Announce the winners in front of the conference attendees** when they are assembled as a group. We did that on the morning of the last day before attendees split up to attend the concurrent workshops. A blue, red, or white ribbon was presented to the top three entrants as they were called to the stage. The county where the honey was produced and the official entry number were also mentioned – this information seemed to be very important to the audience. Be prepared to mail the ribbons if the winners are not present.

25. **Publicize the results of the contest.** A recap of the contest, the winners, and their pictures were announced in the Summer issue of the NCSBA *Bee Buzz* newsletter. This may encourage people who did not attend the event to participate the next time.

That's how we organized and managed this highly-successful, entertaining event without knowing the number of entries and judges ahead of time. If you have additional questions, feel free to contact me at **ncsba.black.jar@gmail.com**. BC

Suzy Spencer is a NC Master Beekeeper and keeps a few hives at her home in downtown Raleigh, NC. She has a special interest in honey-tasting to detect specific aromas and flavors and has attended classes for this in California and Connecticut. She gives presentations to beekeeping clubs and other groups on the basics of honey-tasting.

By the third group, I had my timing and applause lines down. To be fair, elementary school students are easy to entertain. I usually start with a poster of bees, native bees, and ask them which one is a honey bee. Some little fingers point to a bumble bee and some to a carpenter bee and others to an orchard mason bee. It's a trick question, of course, and the kids are flabbergasted that I might play a trick on them.

And so, I tell them honey bees are special – and ask them why pilgrims brought honey bees with them to America. This is no trick question: for honey and beeswax. One skeptic doesn't believe me and wants to know how pilgrims brought bees on the boat without getting stung. That is a good question. Indeed German Black Bees plus wave action seem like an iffy combination, so I just tell him waves put bees asleep. Then, like any defensive adult worried about being outsmarted by a 3rd grader, I change the subject and go on the offensive. I begin a line of questioning about honey: What is honey? What is nectar? I tell them honey is like bees' version of Mountain Dew; it gives bees lots of energy. I pass around a frame of honey.

I proceed to pollen. Pollen is like cheeseburgers and pizza. It provides proteins for muscles for wings and bee legs. I pass around a frame of multicolored pollen, and one kid asks which color pollen taste like pizza and which one tastes like cheeseburgers. I dodge again and move on to demographics.

Bee demographics provide easy material. I start with the number of bees in a hive. Some children guess 100 or 1000. They are, literally, taken aback that 30,000 bees inhabit a hive. Some retreat, concerned that I might have 30,000 bees hiding in the empty display hive beside me. I then target the strained gender relations in elementary school. I ask them how many bees in the hive are girls. Most say "one," the queen. I tell them the queen is female, but all workers bees are female too. To shock and awe, I tell them nearly all bees in the hive are female, and the few boys don't do any work. All the girls in the class take umbrage and say that's not fair. The boys start laughing. Then I tell them the female bees get revenge because they kick the boy bees out of the hive into the cold before winter to die. This nearly triggers a riot.

But what happens next is strange. A young boy, hitherto silent and sitting cross-legged on the floor in the back, shouts out, "And boy bees are called drones!" Even his classmates, who were hurling boy versus girl insults, quiet down. "Yes, boy bees are called drones," I affirm, indeed impressed that a third grader knows this. I notice the teacher and assistant look at one another, but I think little more of the comment and continue with my elementary school greatest hits. I adorn two eager volunteers in bee suits, let them pretend to smoke and work a hive. Then I wrap things up and prepare to rewind for another group.

While the class lines up to march to another station, the teacher approaches and whispers that the boy who mentioned the drones rarely talks, that he has autism. She's stunned he knew about drones. Then she heads off to escort her tribe, as another group of eager children approach for round four. By the end of the school day, after many more rounds, my voice is nearly gone and my brain is drained. And as I pack up, I think about the boy who knew about drones – and I feel invigorated. BC

Conservation Field Day

Stephen **Bishop**

All The Buzzz in...

Beekeeper's Lab by Kim Lehman

This book is full of 52 family friendly activities from around and about the hive including art projects, recipes, experiments, garden activities, and more. Author Kim Lehman is the columnist and creator of the Bee Kid's Corner. Enjoy one of the activities from the book. Used with permission. To order a copy of the book go to beeculture.com or www.quartoknows.com.

LAB 28

APPLE POLLINATION

YOU WILL NEED

- apples
- sharp knife
- cutting board
- butter knife

Successful apple and seed production depends on cross-pollination, or the transfer of pollen between two different varieties of apple trees. This simple experiment reveals the effectiveness of pollination in one apple blossom.

DIRECTIONS

1. Observe an apple, noting the shape, color, and general appearance.

2. Using a sharp knife on a cutting board, cut the apple in half around the middle like the equator of the earth. (Fig. 1)

3. Examine the five carpels, or seed pockets, on each half of the apple. The pistil of the apple blossom is made up of five carpels. Each carpel segment has a stigma, a style, and a portion of the ovary. They are pollinated separately.

4. Using a butter knife, scrape the seeds out onto the fruit's surface. (Fig. 2)

5. Count each fully developed, viable seed. A fully pollinated apple will have ten seeds.

Note: Some possible causes for incomplete pollination include reduced pollinator visits, lack of apple tree varieties for cross-pollination, damaged flowers from a freeze or storm, low viability of pollen, or declining tree health.

BEE BUZZ

It takes two or three hives, or 120,000 to 180,000 bees, to pollinate 1 acre (0.4 ha) of apple trees.

FUN FOR KIDS

Cut open ten apples. Mix in math by making a three-columned chart: description of the apple, number of fully developed seeds, and number of shriveled seeds. Which apples had the most and least pollinator visits? Calculate the average number of seeds per apple. Can you predict the number of seeds by the shape or physical appearance of the apple?

Bee kid's corner

Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
October 2018

Bee B. Queen Challenge

What kind of apple isn't an apple?

What reads and lives in apples?

Why did the apple pie go to a dentist?

Send your answers for these riddles to me at beebuddiesclub@gmail.com

Fig. 1: *Cut an apple in half around the middle.*

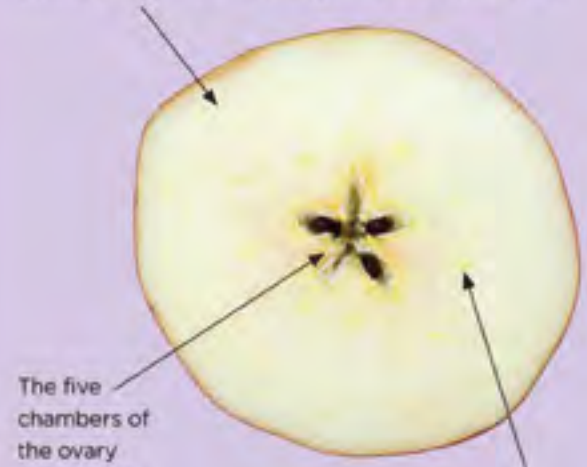
Fig. 2: *Scrape out and count the number of viable seeds.*

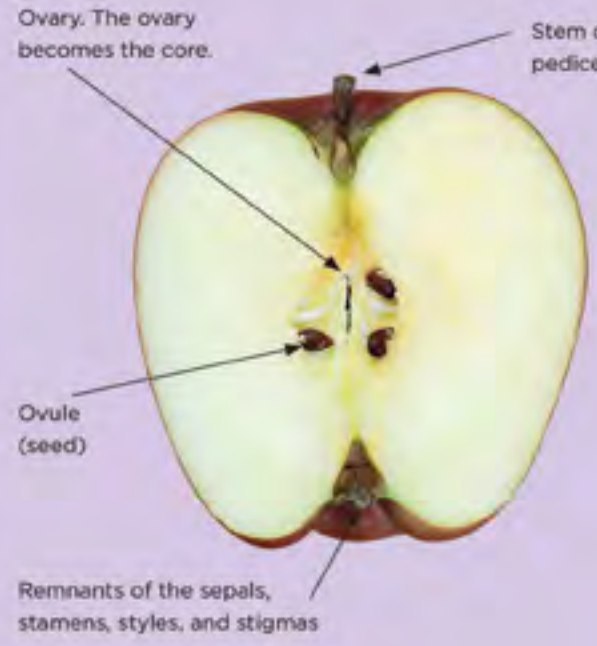
TAKE IT FURTHER

- Record the number of robust and shriveled seeds in at least ten apples within one apple variety. Repeat the process with other apple cultivars and compare your results. How does the seed production of organic apples and locally grown varieties compare?
- Flower parts in multiples of five are often a characteristic of *Rosaceae*, the rose family. Closely examine an apple blossom (which is a member of this family). A normal apple blossom consists of five carpels, petals, and styles. How many stamens can you see? Is it a multiple of five?

PARTS OF AN APPLE

The hypanthium—the tissue that connects the sepals, petals, and stamens—develops into the fruit we eat.





Hazards Of Beekeeping

Lyme Disease Lurks Out There

Ross **Conrad**

Despite all its pleasures, beekeeping also presents many potential risks and hazards. Besides being stung, beekeepers risk hurting their backs lifting heavy supers of honey, getting into poison ivy or poison oak in the beeyard, anaphylaxis and creating domestic disharmony by extracting honey supers in the kitchen. More recently for beekeepers, especially in the northeastern U.S., the increased risk of contracting tick born diseases has also become a real threat.

A number of pathogens have made their way north in recent decades thanks to our human induced warming of the planet and the resulting Northern migration of disease carrying insects and bugs. While incidents of mosquito transmitted West Nile Virus and Eastern Equine Encephalitis have become more common for example, Lyme disease has become by far the most common and is fast becoming an epidemic in some areas, such as the Northeast.

Origins of Lyme

Lyme disease is named after Lyme, Connecticut, where recent records indicate an initial outbreak occurred. The disease was first recognized in the early 1970s after researchers investigated why unusually large numbers of children were being diagnosed with juvenile rheumatoid arthritis and other puzzling and debilitating health issues. Their symptoms included swollen knees, paralysis, skin rashes, headaches, and severe chronic fatigue. Visits with doctors and hospital stays had become all too common in Lyme, and two neighboring towns. The researchers discovered that most of the affected children lived and played near wooded areas where ticks live. They also found that the children's first symptoms typically started in the Summer months, the height of the tick season. Several of the patients interviewed reported having a skin rash just before developing their arthritis. Many also recalled being bitten by a tick at the rash site.

Recently a Yale School of Public Health team of researchers found that the Lyme disease bacterium is actually ancient in North America, circulating silently in forests for at least 60,000 years – long before the disease was first described in Lyme, Connecticut. (Reitman 2017)

What is Lyme disease?

Lyme is an inflammatory disease typically characterized at first by a rash, headache, fever, and chills, and later by possible arthritis and possible neurological abnormalities, such as meningitis, encephalitis, and cranial neuritis. The Lyme disease causing bacteria transmitted by black legged ticks, (aka Deer Ticks) can also cause deadly cardiac disorders such as Lyme carditis.

After its initial discovery, further investigations in the 1980s by scientist, Willy Burgdorfer, discovered that the deer ticks were infected with a spiral-shaped bacterium or spirochete which was responsible for the outbreak of arthritis and numerous other health issues. This pathogen was later named ***Borrelia burgdorferi*** in Dr. Burgdorfer's honor.

The Geography of Lyme

Lyme disease is one of the fastest-growing vector-borne infections in the United States. The number of reported cases of Lyme disease as well as the number of geographic areas in which it is found is increasing dramatically. The CDC estimates that there are over **325,000 new cases of Lyme disease each year** in the U.S.

Lyme disease has been reported in every state in America except Hawaii, although in 2015 about 95 percent of all reported cases were concentrated in the northeastern states of Connecticut, Maine, New Hampshire, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont, significant numbers of cases have emerged in Delaware, Maryland, Virginia, Wisconsin, and Minnesota. (**https://www.cdc.gov/lyme/stats/index.html**) Infected ticks are also fairly numerous in some parts of Northern California, Oregon and Washington, as well as large areas of Asia and Europe.

The explosion of deer population in the 20th century into suburban landscapes, free of wolf predators and with strict hunting restrictions, allowed deer ticks to rapidly invade throughout much of New England and the Midwest. Warmer winters have also accelerated the ticks' life cycle allowing them to survive an estimated 28 miles further north, and at higher elevations each year. Spring is the most active time of year for Deer Ticks, although they are mobile and energetic year-around except during sub-freezing weather.

The Tick Check

Since a tick typically needs to be attached to you for about 48 hours in order to successfully transmit the disease, removing ticks early is key to disease prevention. Both nymphs (juveniles) and adult ticks can transmit Lyme disease-causing bacteria. As a result, it is highly recommended that beekeepers always check themselves over for ticks after returning from the bee yard.

Tick checks need to be thorough and done in a well-lit area. It is especially helpful if you can have someone help check you over, especially on your back. Look closely. Deer tick nymphs are small, not much larger than the period at the end of this sentence.

Ticks that have been attached and feeding for more than a day will become engorged with blood and bloated. Numerous tick removing devices are on the market to help remove ticks without leaving their head embedded in the skin which carries the risk of possible infection.

A case history

After years of checking myself and commonly finding ticks attached to me after a day in the bee yards, I have gotten used to the routine. However, one day this past May I overlooked a tick and didn't find it until it was fully engorged and bloated. Within a couple weeks I got really sick with a headache, stiffness and soreness in my shoulders and neck, and experienced low energy levels. I also broke out in a blotchy rash all over my body. I spent about a week in bed with an initial fever of 102 which subsided to a low grade fever that didn't seem to want to go away.

I went to see the doctor who took a blood sample and sent it away for testing. Given my symptoms and the fact that I had found a tick on me, we suspected Lyme and the test results confirmed it. We also tested for a number of associated diseases that ticks can also transmit and thankfully, the test results came back negative for them.

I immediately started taking a strong antibiotic, doxycycline, every 12 hours. I also went to an herbalist and started an herbal regimen that included tinctures of knotweed, astragalus, andrographis, cat's claw, and sarsaparilla. I took both the antibiotic and herbal tinctures for a full 28 days and thankfully it seems to have worked.

Treating Lyme with antibiotics is widely accepted by the medical profession and has been largely successful, primarily for those with early-stage Lyme disease such as in my case. However, there continues to be heavy debate and controversy on the long-term use of antibiotics for treating Lyme that has progressed past the initial stages, or appears resistant to a course of antibiotics. So far there is no definitive cure for those who have developed late-stage Lyme.

The standard blood test that is usually done for Lyme detects the anti-bodies in your blood that the body produces in response to the infection. Unfortunately, once you have been infected, you will always have the antibodies in your system so you are unlikely to ever know if you have actually recovered. While culturing the actual Lyme spirochete to determine the presence of the disease would provide a more definitive answer, this process is costly and time-consuming, and therefore rarely done. At this point, the best confirmation anyone can expect that they have fully recovered from the disease is that they don't continue to suffer from any of the symptoms associated with Lyme.

An ounce of prevention...

Aside from staying away from wooded areas and not walking through long grass, the preventive measures recommended for reducing the likelihood of getting bitten by a tick and catching Lyme disease are similar to those suggested for working with bees. They include wearing long-sleeved shirts and long pants that are light colored so that ticks are easy to spot should they try to crawl on you. Tucking your pants legs into your socks so ticks are unable to crawl up your leg is also recommended. While this may not be super fashionable, it is helpful in keeping ticks from easily reaching your skin.

The liberal use of a tick repellant of some kind is also helpful. While there are numerous repellants available, those who wish to avoid synthetic chemicals should stick to natural products that contain the essential oil of lemon-eucalyptus (sometimes also called Citron-Scent Gum) as this is the only natural essential oil that has *been* scientifically proven to actually work and is approved by the FDA for use in repelling ticks.

Herbalists also inform me that taking three dropper-fulls of knotweed and astragalus tincture each day during tick season can help make you unappetizing to ticks so they are less likely to want to feed on you. However, the use of herbs does not mean you can avoid having to do daily tick checks and removal before transmission can occur.

Even though Lyme is a rapidly increasing issue, beekeepers can continue to enjoy being out in the bee yard as long as they are aware of the problem and take appropriate steps to stay safe. BC

Ross Conrad is the author of Natural Beekeeping, Revised and Expanded 2nd Edition *and will be a presenter at the Pennsylvania State Beekeepers Association 2018 Annual Conference in State College on November 2nd and 3rd.*

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Beeyard Thoughts, Observations, and Updates

The late Summer suicidal swarms of 2018

Late season swarms

No doubt, this saga is mostly – if not all – my fault. I was naïve last spring. Not that my innocence was special at that moment, for I have had many such episodes where *"doing the right thing"* ended somewhere totally different from what I had anticipated. I was trying to take care of my new packages in every way possible. The project wandered off toward right field.

Late last Winter

I had the now typical 30+% Winter-kill last Winter. No doubt I wrote about it. Messy job it is to clean that equipment. I accumulated some honey that was still consumable honey, but it was rough looking. I would not be eager to eat it, so I set it aside for a few weeks – saving it for bee packages and possibly other needy colonies. By the time the five packages came to me in late April, the honey was oozing here and there and then I really did not feel it was suitable for human consumption.

The packages

Who better to clean and refurbish this honey mess than the experts of honey production – honey bees. In fact, I was curious to know what the bees would do with this less-than-perfect honey. I briefly entertained the thought that they might even be able to recover it to an extractable condition. As this story ended, that didn't happen. Much of it was consumed by the bees.

After I installed each package, I had the luxury of giving that new unit about 50-60 pounds of honey. Initially, I gave the new colonies pollen substitute, but that management need evaporated once natural pollen became available.

After a week or so, queens were out, and all looked good, so I let these new package colonies do their thing. A couple of weeks later, I had a look – smoke was not even needed – and straightaway found that all five packages had great brood patters and all looked good. This was beekeeping at its best. These new colonies, headed by new productive queens had little need of me. I added an occasional deep as needed.

They grew. They grew more. They were never hungry for a minute. They could produce all the healthy brood they wanted. *Varroa* populations were near nothing. No problem there. They grew more – even a lot more. They were big. By hot mid-Summer, they were bearding out front – especially during the evening hours. They were *"fearsome"* bee hives filled with huge bee populations. Clouds of foragers bearing pollen and nectar were returning en masse causing a frenzy at the entrance. What a truly great beekeeper I had proven to be. As Summer passed, the natural spring flow tapered to nearly nothing. Hot and dry.

Truth be told

Actually, I did not want the colonies to be this big. In what must now be hundreds of articles that involve my long-suffering neighbors, I just wanted medium-sized, healthy colonies. In previous rants, I have asked why bee colonies only come in one size – extra-large. Instinctually, it seems that most colonies desire to grow to an extra-large size so they can swarm all Summer; ergo, my neighbors are exposed to swarming bees on their property.

But here they were. Beautiful, large colonies that needed essentially nothing from me. I had grown colony monsters in my apiary. I was (and still am) responsible for them – not just biologically, but also managerially.

If I had a reason to open these colonies, I would have great numbers of bees all around the backyards. It would be hot, heavy work. Even so, I would clearly need to remove some of this honey. There was simply too much on the colonies.

This was a 3# package four months ago.

The first swarm

Any beekeeper with just a short time under his/her bee belt could look at these colonies and tell they were of a swarming population. I just hoped they would not do it. It was very late for them to leave and find enough food reserves in NE Ohio. They were very likely to starve to death this Winter.

Bees are crazy smart – right? They can navigate with the sun. They can find water. They know to stay out of the rain *(more about this later)*. They are simply biologically amazing. They will know that it is not instinctually smart to swarm in late Summer. That's just bee logic.

They swarmed. They swarmed more. Yep, really smart bees they are.

It was a loud hummm...

It was the sound of Spring. I knew immediately what it was. My first angst was to determine which neighbor's place it was going to land. In fact, it was landing about 18 feet up in my apple tree just outside my apiary fence. At least, it's in my yard, but it certainly is higher than I would like. Bee adrenaline was immediately flowing. You know, I have decided that a bee swarm is a lot like an accident. You have a plan, you prepared, you're good to go. Then, there is the swarm – everything you have planned is shot. Something like breaking your arm has a lot in common with a bee swarm. Whatever you were going to do, you are now going to do later.

The swarm was huge

This swarm may have been five-six pounds. I sense that by late October of this same year, it could easily grow to a seven pounder--in my mind. I went into the highest gear that I still have. It was hot and muggy. I was lifting and tugging. I needed trucks, ladders, boxes – I needed it all now. Of course, no help, but the neighbors were all watching.

Of course, it was high – maybe 18 feet. I used a 10' ladder in the back of my truck, but for the first time in my aging life, I did not work off the ladder. I put a bait hive on top of the ladder and used an extension paint roller handle todislodge the swarm. It came crashing down but immediately went back to same spot. After multiple swarm shakes, the huge swarm began to cluster under the edge of my pickup truck bed. Finally, it went into the box I had there – but not happily.

Trying to hive a swarm on Kim and Jim live video.

Some points about this first swarm that were a bit different:

1. Bees stung too much, so I ask you, if late Summer swarms – even fresh ones – are stingier than Spring swarms? We all know that Summer bees are testy bees.
2. Bees were hard-headed. Maybe they already had a new site, but these bees really didn't want my equipment. The equipment was from a dead out last Winter – possibly some dislike there.
3. After they agreed to stay, they built up nicely but are now undergoing queen replacement. This swarm acts like it has all the time in the world.

The second swarm was just as large

You know the drill – drop everything – my bees are swarming. This one went at either a great time or a terrible time. Kim, Kathy, John (the coordinator in Kansas City) and I were conducting a live Kim and Jim show from my apiary. Kim and Kathy stood around – while John and the large audience watched from afar as I proceeded to dislodge the swarm from the ladder. As you know, I already had some experience with this procedure.

The bees did their thing time and again – right back to the same spot. I tried. I tried again. On maybe the fourth time, oh no, the swarm took flight – to my neighbor's I suspected *(yes, they were watching)*. The "show had to go on" but as we looked at bees and talked about packages, my heart and mind were on what I would have to do if they did go to someone else's property.

Just as it was ending, my wife told me they had landed in a Hibiscus bush in our yard and that they were reasonably close to the ground. Great, great, great. We could handle that and we did. The bees seemed eager to occupy yet another winter-kill hive.

Some points about the second swarm:

1. It was on the same limb as the first swarm. Swarms returning to the same spot does happen.
2. It was another large swarm – much like before.
3. I gave this swarm the last of my Winter-kill stores – maybe 40 pounds of honey.
4. The next day, it had settled and was foraging as it should. I gently opened it, found the queen, and saw a small patch of eggs. Done and done.
5. (Now jump ahead about three weeks). I needed an observation hive so I went to this colony. I was shocked to find that it was nearly starving – not quite, but near the edge. The colony had consumed ALL the stores trying to build up a large brood nest. *Just as with swarm # 1, this swarm colony was acting like it was early May.*

Then the third swarm

For the first time in my bee life, the thought, "just let them go" flashed across my mind. I was officially tired of this abnormal behavior. I was low on both equipment and stores, but importantly, I had lost much of my interest in this procedure.

Of course, it was near the spot where the previous two swarms clustered – hardly six inches away.

Get the hive together, get the truck positioned, drag the heavy ladder into position, suit up, dislodge the swarm – all over again. This time, after more than an hour, this

Slowly moving swarm to the nearby apiary.

My "swarm stick" offloading bees. I hope it will capture swarms next season.

swarm would not come down. It went back to the same spot like visible bullets. I was exhausted.

Don't ever do this. I told myself that day that I would not write it, but here it is. I have a pruning pole chainsaw. I could reach the limb without being very high on the ladder. The swarm was not worth it, but you know what I did. Indeed, I did get the limb down without incident. All the roving bees in the area came to the limb, now hanging on my ladder brace. It looked like I had them.

I moved the ladder in 10 to 12 foot jumps until I had the colony positioned in my apiary - Pied Piper as it were. The swarm moved in. I was totally burned out.

It was an overcast day. I spent several hours looking up at the swarm and hassling with it. I concentrated on nothing else. Later that evening – when my eyes were killing me – I realized that I should have worn sun shades. I had sunburned my eyes. I had messy eyes until late the next morning. Don't ever do that.

I was out of honey for feed stocks. I gave them a couple of jars of granulated honey. The next day, I had a look for the queen. No sign. I have looked twice since then. The bees are strangely still and quiet on the comb, but absolutely no sign of a queen. I gave them a frame of brood. I realized they had to be fed.

Then the robbing started

I put on two top feeders on the last two swarms. One is queen-right and good-to-go but very little food and a significant brood nest. The last swarm was near starvation and seemingly queenless.

I spilled two dollops of thick sugar syrup on the landing board of the third swarm. I immediately knew that was not good. Random bees were flying everywhere. Before I could find an entrance reducer, the robbers were attacking. The hive is tight and the feeder does not leak, but that robbing behavior is relentless. Robbers are just crazy.

I can do nothing to help. If I open the sieged colony, I will immediately lose control. If I move it, the robbers will no doubt move to the next swarm – which is presently in good shape.

A managerial headache

This entire situation was caused by too many bees in colonies that are too large. My contention is that these huge swarms are little more than suicide swarms. They have little hope of establishing themselves before next Winter. But each of these swarms have (or did have) my package queens. Now I have three swarm colonies that will not survive if I do not provide necessary stores from the surplus honey the other colonies produced. Add to that, the three large colonies that cast the swarm, are now requeening themselves. Will they be successful?

If I open the large colonies to check their queen condition, I must contend with the robbing behavior in the yard. So I have tried to stabilize all the patients and allow them time to recover on their own – if they can. This is a managerial headache for me.

No science here, but I have made some observations from this ongoing experience.

1. It is commonly said that bees are weather predictors. May I suggest that is a bit of *Malarkey*? One of the reasons I was pushing so hard with the third swarm was that a significant thunderstorm was pressing. It

This bee, having spent the night at the water source, dried off and flew away.

did happen. It rained one inch. This colony swarmed 2.5 hours before the rain came. I suspect that bees' chitinous covering make them water resistant so they care little about rain or weather.

2. I'm surprised at the number of swarm stragglers that stay at the original swarm site – for days. I mean, *"go home."* Why are you still here. You've only been away from the parent hive a couple of hours. Now see #3.
3. When the swarms *naturally* leave the original swarm site, they do it within minutes – I mean 100% gone in just a minute or so.
4. These late Summer swarms stung considerably more than springtime swarms.
5. These late Summer swarms consumed a prodigious amount of food stores in a short time.
6. These late season swarms acted as though they were on the same schedule as in the Spring schedule. Superseding, foraging, brood production – really short on time for all of this activity. Yet, they seemed to try to stay on schedule.

As a beekeeper, I had to do something, but what? This has been a strange situation. Without me, these three swarms do not stand a chance of being here next Spring. In a natural world, these bees would have just died in the Winter. Do you suppose that the parent colony was balancing its bee population to better fit its natural cycle? I don't know.

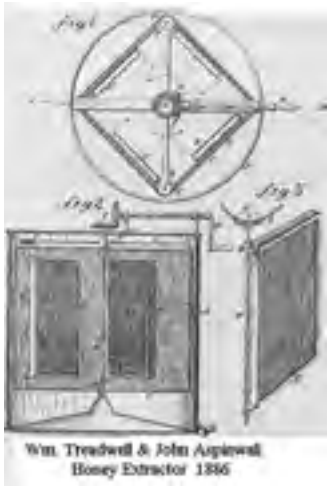
But I do clearly sense that all of these huge colonies casting late, huge swarms is not a good thing for my colonies at this time of the season. Of course, I will let you know what happens next.

Thanks,
Jim

Dr. James E. Tew, State Specialist, Beekeeping, The Alabama Cooperative Extension System, Auburn University, Emeritus Faculty, Entomology, The Ohio State University. **Tewbee2@gmail.com**; ***http://www.onetew.com***; ***One Tew Bee*** *RSS Feed (****www.onetew.com/feed/****);* ***http://www.facebook.com/tewbee2***; @ ***onetewbee***

The Aspinwall Name

Jim **Thompson**



I purchased some Aspinwall no swarm frames in the 1980s and today I thought that I would find a little about him. Get ready for an amazing adventure as you read about some of the Aspinwalls.

There was a person by the name of Lewis Aspinwall, who invented "Block Sheaves Friction Bushes or Boxes for the shives for blocks and for other purposes," April 22, 1835. Lewis Aspinwall was from Albany, NY. Unfortunately the patent office burned down in 1839 and all I have is a cursive copy of the patent. I worked my way through the patent, transposing the cursive to print, to find that he was talking about casting metal. I found out that he was born in 1742, owned a bell foundry, married twice, had four children, moved to New York City, and died June 11, 1852. From the dates, I can tell that this Lewis Aspinwall is not the Lewis Aspinwall that I want to write about.

February 9, 1886, a patent was issued for a honey extractor invented by William B. Treadwell and John Aspinwall of New York. Again this is not the Aspinwall that I was looking for, but I wondered if he might have been Lewis's father. The extractor was a four frame reversible.

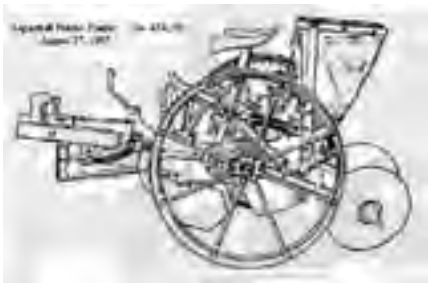
There was a Captain John Aspinwall that served in the navy and had a son John Aspinwall Jr. who had seven children one of which was named John Lloyd Aspinwall. It appears to have been also a different family.

Lewis Augustus Aspinwall was born in 1841 and died in 1930. He is buried in Woodland Cemetery in Jackson, Michigan. His wife's name was Maude Fellows Aspinwall and she was born in Prairie Ronde, Michigan. The reason that I wanted to trace his linage was that he was granted at least 22 patents and I wondered just what he may have done to earn so much money to research and travel in Europe, and be able to file and be granted so many patents.

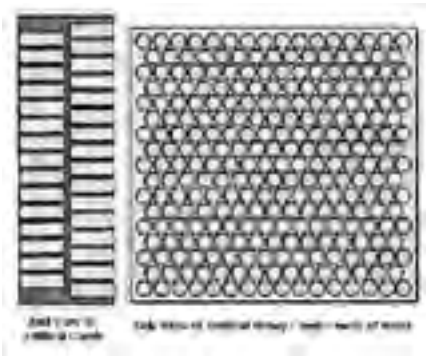
The patents that I found that he was granted are:

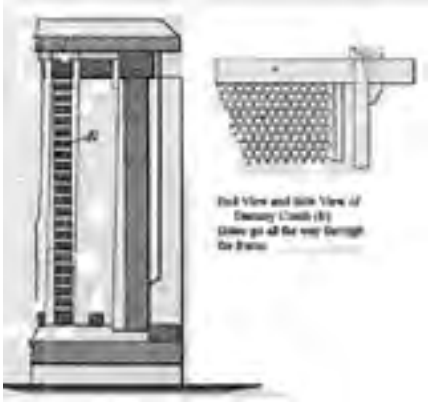
10/27/1874 & 7/20/1878		Patented in England	Potato Planter
1889	No. 397,046	Artificial Honey Comb	while he lived in Three Rivers, MI
12/18/1899		Patented in Canada	Barrel Churn
1893	No. 493,466	Beehive	while he lived in Jackson, MI
	No. 499,002	Potato Cutter	Jackson, MI
1895	No. 540,479	Dummy Combs for Beehives	Jackson, MI
	No. 636612	Churn	Jackson, MI
1900	No. 653,331	Beehive	Jackson, MI
	No. 653,332	Potato Sorter	Jackson, MI
1902	No. 709,660	Potato Planter	Jackson, MI
1904	772,202 A	Potato Planter	Jackson, MI
4/3/1906		Patented in Canada (135,498)	Potato Planter Jackson, MI
8/27/1907	864,595	Potato Planter	Jackson, MI
1908	No. 891,583	Beehive	Jackson, MI
1908	No. 891,584	Beehive	Jackson, MI
1908	No. 891,585	Beehive	Jackson, MI
1911	No. 994,559	Comb Foundation & Section Honey Box	Jackson, MI
1911	No. 1,004,335	Beehive	Jackson, MI
1916	No. 1,198,811	Beehive	Jackson, MI
1920	No. 1,341,454	Potato Digger	Jackson, MI
10/28/1919	1,408,969	Conveyor	Jackson, MI
1922	No. 1,410,444	Non Swarming Beehive	Jackson, MI

Planting potatoes before the invention of the Aspinwall potato planter was done all by hand and would take a crew several days to plant a good sized field. With the Aspinwall planter and a team of horses, one could plant and fertilize that same sized field in less time and with ewer people. Lewis Aspinwall spent nearly $20,000 traveling Europe studying potatoes and perfecting his machine before settling in Three Rivers, Michigan in 1884. The Three Rivers factory which employed thirty men was the only company in the world making a complete line of potato machinery at this time. Unfortunately, a fire destroyed the factory, and he moved the business to Jackson, Michigan in 1891.



The Aspinwall Manufacturing Company operated in Jackson, Michigan until 1921. In the early 1900s the Aspinwall Mfg. Company made about every type of machine related to raising the potato crop. (sprayers, cutters, sorters, diggers, etc.) A combination of increased competition and the agricultural depression of the early 1920s may have contributed to the company's demise. In 1925, L.A. Aspinwall, at the age of 83 went to work for the McKenzie Manufacturing Company of La Crosse, Wisconsin. Perhaps





that was due to the fact that they had purchased his line of potato implements. Aspinwall died in 1930, at the age of 88.

What is interesting to know is A.I. Root wrote or co-authored several ABC books. Some of the ABC books were *Tomato Culture* – (1892), *The ABC of Strawberry Culture* – (1902), and *The ABC of Bee Culture* which was available in French, German, Spanish, and English. His *ABC of Potato Culture* was published in 1911. So it is safe to say, A.I. knew Lewis Aspinwall very well as they also were into keeping bees.

The internet suggests that Lewis A. Aspinwall developed the no swarm frames for beehives in 1897. Whereas I have found that he was patenting his artificial honey comb. He mentioned several types of materials that could be used but his patent was for the making of the comb out of a slab of end grained wood. All the holes would be bored to the same depth and diameter while being parallel to each other.

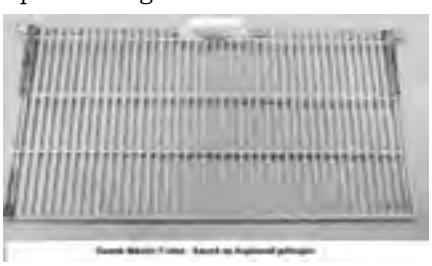
In 1895 Aspinwall developed the Dummy Comb for beehives. This was a frame that had holes drilled in it all the way through. He had discovered that the bees would not attempt to finish the frame and the use of this type of comb relieved some of the swarming tendencies. You might think of it as a follower board with holes.

In 1900, he had a no swarm frame. It was a frame that looked like a vertical queen excluder. The idea that he was trying to solve, was to remove the swarming tendency by tricking the bees into believing that there was more space within the hive.

Bees produce swarms under two conditions, to reproduce or maintain the species and the result of overcrowding. We have specific names given to queen cells, supercedure cells and swarm cells. The natural movement of the mass of bees within the hive is up. When they reach the top of the hive, they believe that they are out of room and so they tend to swarm. You might prevent the swarming if you reverse the supers early enough or add supers on top of the cluster of bees. Aspinwall used three of his no swarm frames and empty comb to make the bees believe that there was some room laterally. He also used his non swarming hive with his frames. In a 1908 *Bee Culture* article, he concluded that his non swarming frames could not be used successfully in a hive with Langstroth or Hoffman frames because of the closed end frames and the propolizing that the bees would do. He also said that his non swarming frames could be moved three times faster than the Langstroth frames.

Now I don't know about you, but I know what happens when I move frames or anything else faster when I am working bees.

In the 1980s, I purchased some Swarm Master Frames based upon his non swarming principle. These frames were made of plastic and according to the directions were placed in between the regular brood frames. Yep the hive didn't swarm. It seems that the non swarming frames prevented the queen from moving from frame to frame as easily and the result was that the hive just never got up to strength to swarm. If I recall



Early two frame radial extractor.

correctly, they didn't produce much of anything.

I have noticed that there is/was a product on the market in 2012 called Comb Forms that made reference to non swarming frames, but I have never seen it available from any bee supplier.

The butter churn developed by L.A. Aspinwall, seems to have been a strange item for him to make, but I wonder if the invention of the four-frame extractor by William Treadwell and John Aspinwall led to its development. Or maybe the Aspinwall Churn led the Standard Churn Company of Wapakoneta, Ohio to patent and make honey extractors. They were issued patent 1,825,020 in 1931 for a three frame extractor, but they also made a green two frame, galvanized, hand crank model. BC

References:

Various Aspinwall patents.

John L. Snyder of Wapakoneta, Ohio, patent 1,825,026

June 15, 1908 Bee Culture, Aspinwall Slatted Frames, pages 758-759

Article, Stuhr Museum of the Prairie Pioneer's Antique Auto and Farm Machinery Exhibit

Article, Hidden History of St. Joseph County, Michigan

Standard Churn Company's two frame extractor from my collection.

Native Bee Conservation In Nicaragua

Farmers in Central America have been practicing beekeeping for hundreds of years. Now, Paso Pacifico, a biodiversity conservation organization based in Ventura, California, is working with farmers in Nicaragua and introducing educational programs for children to ensure this tradition continues as an integral part of the culture for generations to come.

Leading the way for Paso Pacifico is Bee Project Coordinator Marcos Calero, who has become a local bee biodiversity expert in Nicaragua's Paso del Istmo Biological Corridor. Calero, who has been with Paso Pacifico for more than six years, regularly meets with farmers in the region to discuss the ecological significance of their work and provide training on innovative ways to manage their hives.

Paso Pacifico Bee Project Coordinator Marcos Calero in front of stingless beehives at the Mono Bayo Reserve in southwest Nicaragua. Roberto Pedraza photo

While some of the farmers may be skeptical when first approached by Calero, they quickly realize that both parties share a strong desire to protect and conserve these populations of stingless bees, and that working together can produce more favorable outcomes. Due to deforestation, an increase in pesticide use, and the overharvesting of honey from the forest, native bee populations have been on the decline, so any insights on effective, sustainable beekeeping practices are typically welcomed. Paso Pacifico also connects the farmers with stores in Rivas and Managua, where they can find a fair price for their product.

One of the innovative practices Calero suggests is the transfer of hives from logs and branches to specially-designed wooden boxes, which allows for honey to be harvested in a manner that is less disruptive and more sanitary. Additionally, the wooden boxes make it easier to monitor the bees, and provide the ability to divide and increase the number of hives without having to remove more native trees and branches from the forest.

Another technique Calero incorporates into his program is using a syringe to extract honey from hives. This extraction method produces a much cleaner honey compared to traditional harvesting techniques. The syringe allows honey to be taken from the hive without mixing with wax, pollen and clay, which results in a honey that is less acidic and clearer in color.

A typical stingless bee box hive.

Stingless bees, honey and comb.

Extracting honey with a syringe . . .

. . . makes for better honey.

Using what he has learned during his time with Paso Pacifico, Calero has now presented twice at the Mesoamerican Congress on Native Bees, once in Chiapas, Mexico, and once in Antigua, Guatemala, including findings from the over 1,400 specimen records of 70 types of native bees that have been documented during his travels. His presentations also focus on the relationships of interdependence these native bees have with the region's flowering plants and crops. In Nicaragua, native bees help pollinate a long list of crops including squash, coconut, coffee, avocado, guava, chayote, annatto, tomatoes, and passionfruit.

"When I first got involved with Paso Pacifico's native bee program, I was already familiar with the important roles that bees play in the environment, but I had no idea how many different types of bees we had in the region," said Calero. "I consider myself a leader in meliponiculture (beekeeping with stingless bees) in the Paso del Istmo, and this is something that I've achieved through the knowledge I've attained with Paso Pacifico."

This important work with native bees is now being incorporated into a number of Paso Pacifico's initiatives, including their Junior Ranger program and their *Million Trees by 2020* campaign.

The Junior Ranger program was launched in 2012, and impacts approximately 100 children between the ages of eight and thirteen each year. This popular afterschool and weekend program combines classroom instruction, experiential field trips, and community service projects to teach principles of biology, ecology, and environmental citizenship. Students learn about and come face to face with sea turtles, endangered monkeys, and other natural inhabitants of Nicaragua. In 2017, a five-part educational module on native stingless bees was introduced into the curriculum, giving children an opportunity to engage in hands-on, interactive activities and learn about pollination, conservation, and other aspects of responsible beekeeping. Junior Rangers then share what they learn with family and friends, helping to spread the word about environmental conservation in their communities.

"The kids showed interest in everything I explained, but they especially lit up when they got to look at bee specimens with magnifying glasses," Calero reported after first working with the Junior Rangers.

Paso Pacifico's *Million Trees by 2020* campaign is a major fundraising initiative that was launched on Earth Day earlier this year. The purpose of the campaign is to raise $10 million by the end of 2020 to plant, manage, and protect 1 million native trees in Nicaragua to help combat the harmful effects of climate change. While many reforestation projects plant tree species based on price and availability, Paso Pacifico's program will plant a diversity of native trees that will also provide a source of food for villagers and improve habitats for wildlife, including local populations of bees that pollinate flowers found in Nicaraguan forests.

"Even though we have developed a wide variety of conservation projects, everything we do is connected and intentional," said Paso Pacifico Founder and Executive Director Dr. Sarah Otterstrom. "Our native bee project is a perfect example of that ecosystem at work, as both the bees and the native flora in Nicaraguan forests rely on each other for survival. Our goal is to implement initiatives that will help all inhabitants of Mesoamerica's Pacific Slope thrive, including both human and wildlife communities."

To learn more about Paso Pacifico's biodiversity conservation projects, visit **www.pasopacifico.org**.

About Paso Pacifico

The mission of Paso Pacifico is to restore and protect the Pacific Slope ecosystems of Mesoamerica. These habitats include the endangered dry tropical forest, mangrove wetlands, and eastern Pacific coral reefs. By working with local communities, landowners, and partner organizations, Paso Pacifico restores and protects the habitats that form building blocks for wildlife corridors. Paso Pacifico also lends its expertise to help migratory wildlife on the Central Coast of California, including threatened migratory birds and whales that overwinter in Mesoamerica. Through its high-impact programs, Paso Pacifico has established itself as one of the world's leading biodiversity conservation organizations. BC

It's That Time Of Year

Beeswax Candles, Lip Balm, Soap – Gift Baskets!

It's October! Along with preparing for Halloween, the stores will be encouraging you to think about the Christmas season. So now it is time for you to make some plans for gift baskets. They are actually a wonderful way to advertise your honey and any other hive products you make. If you do make other products such as beeswax candles, lip balm, soap, you should check your supplies of those. If you need to make some more you have plenty of time. That is, if you start now! Not every item has to be from your own bees. If you buy these items from other beekeepers they would appreciate your letting them know now – not two weeks before Christmas when they are also too busy with holiday preparations.

In addition to the assorted beeswax items, both mead and beer made with honey are good additions to gift baskets. These will have their makers' labels on them. You may need to make certain those labels are legal. No health claims should be on labels for things like lip balm and lotions or, actually, for any other item. Just because you eat some pollen, a container of it would be a poor choice for a gift basket unless you are totally certain the recipient eats it. Pollen, and also propolis, can cause allergic reactions.

Actually a gift basket does not have to be only for Christmas. A gift basket can be for a wedding, an anniversary, the arrival of a new baby, a birthday, someone's retirement, welcoming a new neighbor, a small child's birthday – what other celebrations can you think of? A bee-themed gift basket is the perfect gift for that someone "who has everything." What other holidays and celebrations can you think of throughout the year? Easter, Valentine's Day, 4^{tth}of July, Thanksgiving, New Year's, and, yes, Halloween. A gift basket is best when it has a theme. It is not a container for tossing in everything you can think of. With contents appropriately chosen for the recipient, your gift basket will definitely be appreciated and the items used.

At this point in the year, you have time to consider selling gift baskets. Some companies, large or small, give a gift basket to a loyal customer or client. People today are used to thinking "local," especially for food items. Your honey is definitely a local product. If you have a photo of a gift basket you made in the past you can use that for a simple brochure to advertise them. You don't have a photo? Take a photo of the next basket you make, then continue to take photos. These demonstrate the versatility of honey-themed gifts to potential customers. Photos taken with a cell phone can easily be sent to a customer. Although you may want your label on items in a basket, some customers may wish to have the name of their business displayed. That is a reasonable request but you can ask where your own label can be placed in case the recipient of the basket wishes to buy some of your products.

Just because this item is called a "basket" does not mean it must be made in a real basket. For someone just married, the container could be a cooking pot or a fry pan. Think about the hobbies of recipients. Gardening, gourmet cooking, handcrafts, painting. Think about the occasion for the basket. Yes, Christmas and other holidays, but also birthday, anniversary. Santa's sleigh and a Halloween pumpkin could certainly be used, as well as a typical Easter basket. Look in craft shops close to holiday times. Is there some container that could be more appropriate than a real basket? If so, use it!

Ann **Harman**

Is there someone in your area that makes handcrafted baskets from local materials? These handmade baskets could be ideal, especially if you have a choice of shapes and sizes. Be certain the basket-maker has name and contact information on the basket.

To get some ideas for containers other than baskets and also for decorations you need to visit some shops. Craft shops always have items and decorations that will help you create an individual gift basket. As you visit an assortment of shops throughout the year keep a lookout for things that would be useful for your gift baskets. Don't forget one item that is a big help – some sort of "stuffing" that will keep the jars and other containers in place. A finished gift basket is handled many times before it finally gets "home." Items that are a part of the gift, such as a bee-themed towel or t-shirt, can be part of the stuffing. However, depending on the size of container and number and size of items, more stuffing will be necessary. Most stores have a gigantic sale on specialized items for a few days immediately after a particular holiday or celebration. Yes, you might have to store those for a year, but it's possible some could be used anytime.

What if the recipient is a beekeeper? Think about what bee products this keeper produces. Honey? Well, if your honey is from a totally different plant source, the beekeeper may very well appreciate a jar of it. What about creamed honey, beeswax candles, soap? Not every beekeeper makes those or other such products. Some beekeepers collect bee books – is there a new one on the market? Books make a perfectly good addition to a gift basket.

You can look through the beekeeping supply catalogs and find a number of things suitable for including in just about every basket. Honey candy and honey sticks are popular. Some suppliers have Sue Bee Honey Barbecue Sauce in two flavors. The wooden honey dippers make a useful addition. They come in several styles. A few honey cookbooks are available. If someone who loves to cook discovers using honey, you may have a new customer. You have a choice of quite a number of books for children of different ages. For a gardener, you could include a packet of seed for pollinators. If you are certain the recipient likes bees, you can find some potholders and kitchen towels decorated with bees. The National Honey Board has quite a collection of recipes using honey. If the recipient likes to cook, put some of the National Honey Board recipe folders in the basket. Provide the contact information for the Board so the recipient can find more recipes.

Various food items, made with honey, can be part of a gift basket. Quick breads and cookies are easily made and appreciated. Does the recipient have a dog? Make some dog biscuits using a recipe with honey.

List ingredients on all cooked or baked items so the recipient knows exactly what it contains.

Some honey shows have a class for gift baskets. If such a show is near you, enter one of your gift baskets. If you win a prize, take a photo to use in advertising your baskets. Some shows will specify a theme that makes entering a basket, as well as judging them, much easier. Those shows that do not give a theme usually end up with enormous baskets, with quantities of colorful wrapping and too many bows. The baskets are crammed full of everything having to do with bees and honey (except for a real hive with real bees). Many of the items may never be used by the recipient of such a basket. Check the show rules for entering to see if all the items are required to be the product of the person entering.

Some people like honey and other products but are not interested in bees depicted all over everything. You want the recipient to be able to use everything in your gift basket. It does not have to feature bees but rather honey and products made with honey and wax.

A very, very few people do not like honey. And some, such as diabetics, may not be able to use honey. You need to give some thought about having other main features in your gift baskets. With the variety of candle supplies available from beekeeping equipment suppliers and also just candle-making suppliers, these can be a feature item of a basket.

Do you or another beekeeper make beeswax candles? A beautiful pair of tapers may be appreciated. Don't forget the colorful rolled candles and ones made from the wide assortment of molds. Beeswax in its natural color is very pretty but some may prefer colored candles, perhaps appropriate to the season or holiday. Others want colored candles to match their home décor, no matter what the season. The small decoratively-shaped candles can also be painted. If the basket has a holiday theme, such as Christmas, always have at least one candle that is appropriate. Candles are an excellent item for your gift basket.

You, as a beekeeper, may enjoy creamed honey or chunk honey or just a piece of comb honey. However, someone unfamiliar with these forms of honey could be totally puzzled and really not appreciative of any of these. Someone told me a long time ago that he did not like to eat honey in the comb because the wax stuck to his false teeth. So unless you are certain that the recipient knows and likes comb honey it would be best not to use it in a basket.

It would be possible to put a

hangtag on a jar of creamed honey. The tag could explain that this is 100% pure honey, but just in another form. Explain that it was especially crafted not to be runny. Say that it can be used in all the ways liquid honey can be used. Don't forget to add that it won't run off of a peanut butter and honey sandwich. Sales of your creamed honey just might increase.

Suitable containers for your liquid honey need to be considered. Beekeeping equipment suppliers offer a large selection. Squeeze bears are always popular. The "inverted" jar (the one that seems to be upside down) is increasing in popularity. The queenline jar is traditional and easily recognized. Hex jars are elegant. The Muth jar is distinctive. If you have made honey from different sources then using two or three small jars give the recipient an introduction to the varied world of honey. Don't forget the two-ounce bear. The labels on the honey jars can be your normal label or one designed for the occasion. If you are using a one-pound jar you could add a label that says "bees visited two million blossoms to make this honey for you."

A gift basket may need a card that has the name of the person giving the basket. Some beekeepers who are photographers do make cards of bees on flowers and the cards are usually blank inside. A message and the name of the giver can be written. If the recipient is a beekeeper a gift certificate from an equipment supplier or a queen breeder would be a nice addition to the basket. If you have obtained items, such as candles or cosmetics, from another beekeeper be certain that their contact information, as well as yours, is in the basket.

Use your imagination when creating a gift basket. If you know the recipient you may already have some ideas. If you do not know the person who will receive the basket, perhaps you can find out something about the recipient. If not, then create a balanced assortment. Always keep in mind quality and design, not quantity. BC

Ann Harman lives, writes and keeps her bees in Flint Hill, Virginia.

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Artists Showcase Beehives

Megan **Ryan**

Six Fort Wayne Artists Showcase Beehives In Support Of Pollinators

From van Gogh to Monet to O'Keeffe, nature and our natural environment have been an ongoing inspiration for artists throughout time. In collaboration with Southwest Honey Co., six Fort Wayne artists felt inspired to utilize their creative talents to paint beehives to benefit pollinators and pollinator education to be showcased during National Pollinator Week (June 18-24). As awareness of pollinators is a key element to assist pollinator populations, the hives will be used to help educate the community about declining pollinator populations, why pollinators are important, as well as what the average person can do to help.

Recently known for large public murals, live painting during Philharmonic performances, environmentalism, feminism and other notable accomplishments, each artist is actively involved in the Fort Wayne community in a large capacity, and so it is fitting that they would volunteer their talents to highlight such a worthy cause. These well-known local artists include Jerrod Tobias (Tobias Studios), Theoplis Smith (Phresh Laundry), Frank Louis Allen, Alexandra Hall, Alyssa Deck, and Lissa Brown (Tiny Clementine).

Beginning Saturday, June 16, the six hives will be exhibited at the Foellinger-Freimann Botanical Conservatory (1100 S Calhoun St, Fort Wayne, IN 46802). The public is invited to view the hives during their hours of operation (Tues-Sat. 10am-5pm, Sun. Noon-4pm). Each hive will be adorned with the artist's biography, contact information and information about the project.

As a fundraiser, the hives are also available to be 'adopted' by the public on Southwest Honey Co.'s website (**https://southwesthoney.com/adopt**). Eventually, each hive will be a home for honey bees in one of Southwest Honey Co.'s sustainable apiaries located on organic farms or naturally preserved lands. The adopter will receive *sweet perks* from Southwest Honey Co. including a personal beekeeping experience, seasonal updates of what the bees are up to and of course, honey.

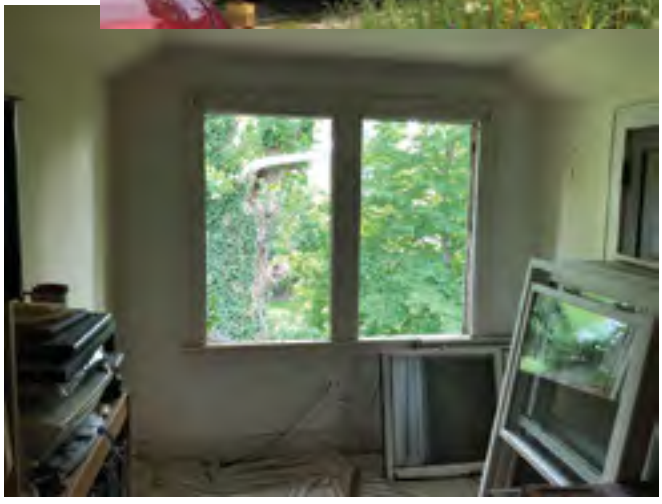
"Each adopted hive supports pollinator education in Northeast Indiana. Over the past two years, we have had the opportunity to teach over 1,600 children & adults about pollinators in our community through our fun, hands-on, exploratory programs. With the support of our volunteers, we host educational events at local libraries, schools and community centers; as well as under our 'science tent' at The Southwest Conservation Club, which is perfect for home-school groups, scouts, 4-H clubs and more," Ryan commented about the Adopt A Hive program. She is Southwest Honey's Education Director.

Southwest Honey Co. Through the support of volunteers, Southwest Honey Co. cares for over 50 hives in sustainable areas including organic farms and naturally preserved properties around Fort Wayne, Indiana. More than just beekeepers, the conservation organization is dedicated to creating sustainable habitats for pollinators, promoting awareness of their population decline and educating the public on ways they can help through pollinator education programs in the community. Renowned for their unique pollinator educational programs for children and adults, the organization has been featured in over 45 local and national media outlets over the past two years. Southwest Honey Co.'s efforts are funded through the support of corporate sponsorships, private donations and customer purchases of their locally made products. More: **southwesthoney.com/** BC

Southwest Honey Co. www.southwesthoney.com

starting to smell the goldenrod honey being brought in. That's always a treat. Kim says it's the smell of money. Unfortunately, even though we have a nice bloom we are having days and days of rain. So we probably won't get much of that nice honey this year.

This was the Summer of some major repair projects around the old house. The house we live in was a kit house built in the 1920s. Kim has lived there more than 30 years and I've lived there almost 12 years. So over the Summer months in the extreme heat we had roofers come in to repair a leaky porch roof. We had tree guys come in to remove some very old trees that were getting unsteady. We had some drainage pipes put in to compensate for some landscaping hiccups from a neighbor which kept leaking into our basement. And best of all, we got all new windows throughout the house.



This was quite a project for Kim and I. The guys who put the windows in – friend Ben and his team of two – were amazing. They showed up on a Saturday at 8:30 a.m. and were done and out of the driveway at about 3:30 p.m. However, when you get new windows you have to move everything away from the windows before they get there. Some of you have been to our house and you know how much 'stuff' we have. So that took about two days to get everything out of their way.

Of course, after they're done you have to put everything back. We're still working on that. The goal is not to block any of the windows with large pieces of furniture. So it's a process! We have found things we didn't know we had. Some of the windows had not been opened since I've lived there, so it was a joy to have every window in the house open.

On our travels we run into many interesting people – bee people and others. I'm fascinated by the number of people that have amazing tattoos. I've toyed with the idea of getting just a small bee on my wrist, maybe. But the thought of the pain involved has always kept me from it. Several years back we did a story on bee tattoos. We want to do it again. So please send us photos of your bee tattoos – please keep it clean – and down the road in a few months we'll do another story. Send to **Kathy@beeculture.com**. Here are a couple of examples of ones we've run into lately. The one on the arm was a lady at EAS 2018. The other was a young lady in a local Medina restaurant. Kim and I stopped for supper one night and had on bee t-shirts (imagine that) and she showed us her tattos. She's not a beekeeper, just likes bees.

So heading into Fall and Winter I hope your bees are strong and that you're ready for whatever Mother Nature throws at us this year.

Here at *Bee Culture* we are gearing up for our annual Fall event – this year it's My Story and we have over 120 people registered already. If you're one of those we can't wait to see you. It will be a great time.

CALENDAR

♦INTERNATIONAL♦

Cuba Beekeepers Tour 2018 will be November 10-18.

Featured will be visits to apiaries, queen rearing, processing plants, research centers and more.

For more information please contact Benita Lubic CTC, President, Transeair Travel LLC, 2813 McKinley Place NW, Washington, DC 20015; 202-362-6100, 202-362-7411 Fax; **blubic@aol.com**

♦ARKANSAS♦

Arkansas Beekeepers Association will old their annual conference October 26-28 in Little Rock at the Holiday Inn Convention center by the airport.

Dennis vanEngelsdorp will be the featured speaker.

For more information please contact Jeremy Bemis at **jeremy@bemistreefarm.com**.

♦CALIFORNIA♦

Alameda County Beekeepers will hold a Randy Oliver Workshop October 6. Exact location will be sent to participants.

This workshop is aimed at beginning to intermediate beekeepers. Morning lectures and afternoon hands on. The cost is $60/person. Attendance is limited.

To register visit **https://www.eventbrite.com/e/acba-randy-oliver-workshop-tickets-47837418005**.

California State Beekeepers Association will hold their annual convention November 13-15 at Harrah's Resort in Funner.

For more information visit **www. californiastatebeekeepers.com**.

♦COLORADO♦

The CO State Beekeepers Association meets October 27 in Castle Rock at the Douglas County Fairgrounds.

Speakers include Diana Cox-Foster and Tina Sebestyen plus the award-winning film *Last of the Honey Hunters*, about gathering honey in Nepal.

Details and registration at **www. Coloradobeekeepers.org**.

♦CONNECTICUT♦

Southern New England Beekeepers' Assembly will be November 17 at Groton Inn, Groton, CT. Registration is $55, late registration, $75.

Speakers are Jay Evans, Rebecca Masterman and Larry Connor.

For information and to register visit **www.sneba.com**.

Back Yard Beekeepers – each month hands on inspection workshops, bee school, mentor program and more.

Speakers include October 30, Dewey Caron; November 27, Bill Hesbach.

For information **visit www.backyardbeekeepers.com**.

♦INDIANA♦

The Beekeepers of Indiana will hold their Fall Conference and Workshop October 26-27 at Swan Lake Resort in Plymouth.

Featured speakers include Rebecca Masterman, Jerry Hayes and Michele Colony.

For information and to register visit h**ttp://indianabeekeeper.com/.**

♦MASSACHUSETTS♦

Mass Bee Fall Meeting will be November 17 in Bristol County.

Speakers are Jamie Ellis and Sam Ramsey.

For information visit **www.massbee.com**.

♦NEW YORK♦

Empire State Honey Producers Association Fall Meeting – ESHPA 150th Anniversary – will be November 1-3 at the Hilton Embassy Suites-Destiny USA, Syracure.

Speakers are Jay Evans, Diana Cox-Foster, Richard Ball, Emma Mullen, Scott McArt, Dennis vanEngelsdorp.

For more information and to register visit **ESHPA.org** or contact Angel Conway, 315.263.7501.

♦OHIO♦

Lorain County Beekeepers, How To Collect, Process, Clean and Store Propolis, November 9, presented by Jeannie Saum, at Life Church, Grafton. Meeting starts at 7:00 p.m.

For information **www.loraincountybeekeepers.org.**

♦OKLAHOMA♦

The Oklahoma State Beekeepers Association will have their Fall conference October 20 at the Will Rogers Garden Center, 6393 Northwest 36th Street, Oklahoma City.

For more information please visit **www.okbees.org**.

♦OREGON♦

The Oregon State Beekeepers Association Fall Conference will be held October 26-28 at the Salem Convention Center, Salem.

Speakers includ Jennifer Berry, Anna Childers, Danielle Downey, Michelle Flenniken, Krispn Given, Steve Pernal, Ramesh Sagili and more. There will be beginning classes and a large vendor area.

For information visit **www.orsba.org.**

2019 Bee Culture Calendar Contest

There's still time – October 1 is the deadline. The topic is All Things Royal – Queens! Retinues, laying eggs, emerging, being fed, mating – that would be a sure one, as would a drone comet with a queen in front, queens fighting, queen banks, queen cells, grafting queens, caging queens, holding a queen, marking queens. If you got a queen you got a picture. All Things Royal. Send photos as JPG attachments in an email, one per email, to **Kim@BeeCulture.com**. If your photo is too large it won't come through. We will respond if we get your photo. If you do not hear back from us we did not get it. Reduce the size/resolution and send again. **With every photo you send include name, address, phone, or we can't use it.**

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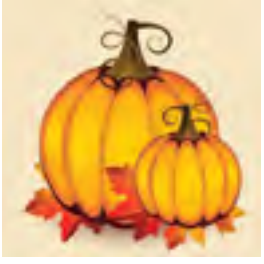

If you are having an annual meeting or teaching a beginning beekeeping class, we are happy to send you magazines to give to your attendees and students. BUT – we need to receive your request four weeks before your event so that we have time to process your request. Please email Amanda at Amanda@BeeCulture.com with the number of magazines needed, a complete mailing address and a contact person.

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That Redheaded Tina

Ed **Colby**

That redheaded Tina rolled into Colby Farm late from Durango in her '94 Volvo after she had to detour around the mudslides south of Red Mountain Pass. She did look at some bees on the way. The gal Marilyn and I put her in the guesthouse out back. We all got up with the roosters but lingered over breakfast. Then Tina and I lit out over the mountains for some honey bee politicking.

Tina likes to wear a dress in the beeyard. She argues that it's when bees get caught between tight clothing and your skin that they like to sting you. This inspired me to wear hiking sandals when I'm in the beeyard. It works! Bees might pepper my veil and find the holes in my jeans, but they almost never sting my toes. And tickling bees on bare feet lets me know when the little darlings are thinking about climbing up my leg to check if I'm wearing underwear.

Tina and I are neither of us city folks. I'm generally lost every time I cross the Continental Divide and descend into the Denver/Boulder/Colorado Springs maelstrom. She likes to say, "I don't know the difference between Arvada and Aurora." This resonates, because I don't know the difference either.

To keep the conversation lively as we climbed over Vail Pass, Tina launched into a political tirade. Not bee politics, on which we're staunch allies, but right versus left, with a pinch of The Donald thrown in. We didn't agree on much. After we wore that one out, we started in on religion.

Just when I thought I might have offended her with my take on right, wrong, and the meaning of truth, Tina startled me. "Ed!" she said. For an instant I took my gaze off the road and looked into the bluest blue eyes. "I'm really enjoying our conversation!" she exclaimed.

Father Bob liked to slip in a good clean joke now and then at Mass. I wish I'd thought to tell this one to Tina:

Pope Francis is praying in his study, when the phone rings. It's God. He says, "Francis, my faithful servant, I have some good news, and I have some bad news. What do you want first, the good news or the bad news?"

"Oh, I'll take the good news," the Pope replies.

"I've decided to unite all the world's believers under one religion. No longer will there be religious bitterness or strife."

"That's the answer to my prayers!" Francis exclaims.

"And now the bad news," God says.

"How can there be any bad news after what you just told me?"

"You're not going to like this," God says, "but I'm calling from Salt Lake City."

This was one of Father Bob's favorite jokes, and it's surely one of mine.

Tina brought a GPS, so she's way ahead of me. I'm still trying to figure out my flip phone. My idea of finding your way in a strange town is to have a human navigator riding shotgun with a Rand McNally road atlas barking out instructions.

We were only 20 minutes late for our meeting, and the polite folks at the Colorado Department of Agriculture were waiting for us. Tina and I were emissaries from the Colorado State Beekeepers Association (CSBA), and the Ag people knew we had a beef. They listened attentively and nodded at appropriate moments as Tina and I did most of the talking. This all had to do with who might best represent Colorado beekeepers on the state's Pesticide Advisory Committee, and who might not.

I'm not going to hang dirty laundry here. Bee politics can damage tender ears. Suffice it to say that there are significant differences of opinion among Colorado beekeepers on just about everything. In the end, the Department of Agriculture officials invited the CSBA to submit its own candidate for the upcoming beekeeper vacancy on the Pesticide Advisory Committee. Great!

But you know how in sci-fi movies somebody figures out that their neighbors are from Outer Space, and they report it to the police chief? Then afterwards they wonder if maybe, just maybe, the chief is an alien, too? That's what it felt like challenging the Ag establishment and the status quo.

It's August as I write, and the drought here in west-central Colorado continues unabated. We have fires all around us. The smoke envelops you. Like a novice smoker, I got used to it and finally stopped coughing. Here in the Colorado River Valley the un-irrigated land feels brittle, it's so dry. Toss your stogie out the car window, and the cheat grass is sure to burn like gasoline.

Remarkably, bees in some locations are making honey.

A rancher traded me fishing access for honey. A little creek meanders through his place. In Autumns past I spotted big brown trout that presumably came up from the Colorado River to spawn. I don't know how they'd make it this year due to the low water. I dropped off a case of quarts by the rancher's back door this afternoon. Now I need to break out my rod and see if I can find my fly box. This means temporarily dropping my obsession with bees and mites and honey harvest and taking a day or at least a morning off. I can do this. Really.

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WINTER HIVE WRAP with INNER PAD
#644- $22.95

PROVAP 110 OXALIC ACID VAPORIZER
#PVOV- $485.00

MEGABEE PRE-MADE PATTIES
10 lb box #MBP-10- $29.95
40 lb box #MBP-40 $76.95

MITE AWAY QUICK STRIPS
#MAQS-4 - $12.95/4 PADS TREATS 2 HIVES
#MAQS-20 - $49.95/20 PADS TREATS 10 HIVES
#MAQS-50 - $109.95/50 PADS TREATS 25 HIVES

FORMIC PRO
#FPRO-4 - $14.65/4 PADS TREATS 2 HIVES
#FPRO-20 - $55.95/20 PADS TREATS 10 HIVES
#FPRO-50 - $115.75/50 PADS TREATS 25 HIVES

Honey Bottling

CLASSIC PLASTICS
8 oz - $19.99/50 ct. Case
16 oz - $23.99/50 ct. Case
32 oz - $39.99/50 ct. Case
No Caps

PLASTIC PANEL BEARS
2 oz Panel Bears $229.95/800 ct. Case No Caps
6 oz Panel Bears $181.45/660 ct. Case No Caps
8 oz Panel Bears $144.95/525 ct. Case No Caps
12 oz Panel Bears $114.95/400 ct. Case No Caps
16 oz Panel Bears $94.69/240 ct. Case No Caps
24 oz Panel Bears $89.50/195 ct. Case No Caps

DECO EMBOSSED JUGS
5 LB- $78.35/72 ct. Case
3 LB - $99.95/126 ct. Case
No Caps

12 oz & 3 oz GLASS SKEP JARS
12 oz skep jars $10.45/12 ct.
includes Gold Metal lids
3 oz skep jars $11.95/24 ct.

MUTH JARS
4 oz - $28.49/36 ct. Case
8 oz - $12.95/12 ct. Case
16 oz - $16.95/12 ct. Case
includes corks

CLASSIC GLASS JARS
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16 oz - $8.45/12 ct. Case
32 oz - $12.95/12 ct. Case

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