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Bee Culture

July Features . . .

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Executive Publisher – John Root
Associate Publisher, Senior Editor – Kim Flottum, Kim@BeeCulture.com, Ext. 3214
Assistant Editor, Design – Kathy Summers, Kathy@BeeCulture.com, Ext. 3215
Social Media, Event Specialist & Subscription Coordinator – Amanda DeSimone, Amanda@BeeCulture.com, Ext. 3255
Advertising – Jean Newcombe, JNewcombe@BeeCulture.com, Ext. 3216
Publications Assistant – Kaitlin Newcombe, Katie@BeeCulture.com

Contributors
Clarence Collison • James E. Tew • Ann Harman • Kim Lehman • Phil Craft • Larry Connor
Connie Krochmal • Jessica Louque • Toni Burnham • Ross Conrad • Jennifer Berry • Ed Colby

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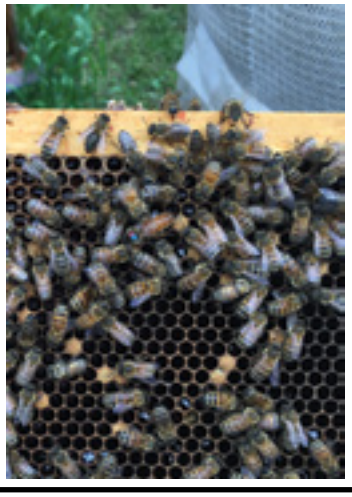

One of Dan Conlon's Russian queens. Photo by Kim Flottum

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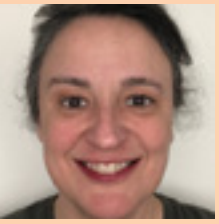

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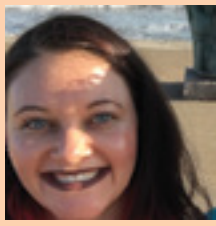




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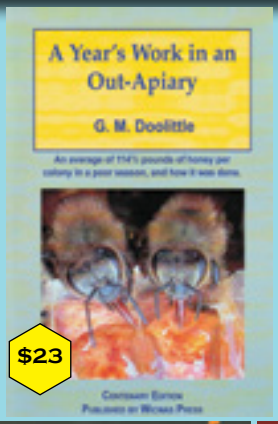

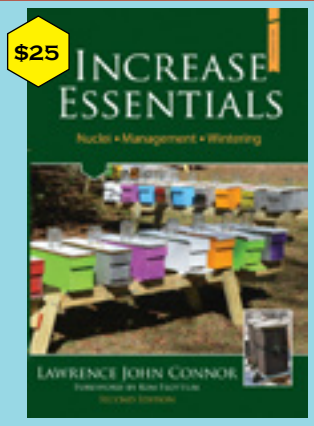

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Treatment Free Debate

This is a response to the commentary submitted by Vicki Kleber in the June 2017 issue entitled Treatment Free Debate.

I had to have a hearty laugh after reading Vicki Kleber's commentary on the Treatment Free Debate. Vicki rambles on and on about the efficacy of her treatment free IPM practices and how this system requires "deep knowledge" which she alludes most people (except her) just don't have. She takes personal insult to the fact many hobby beekeepers don't have a basic knowledge of standard and effective beekeeping practices and writes she promised herself she won't even sell bees to those who have no "local training" to get their hobby started.

Vicki's arrogance actually shines brightest when she suggests she lost many of her most "pampered, intensely monitored, and northern bees" due to local uneducated beekeepers who would have the audacity to keep hives near hers and cause her to experience such loss.

She even goes so far to suggest *Bee Culture* Magazine "preaches and moralizes" to subscribers with their article content. Vicki does write she is "open to new ideas" so in lieu of her personal "moral judgement" assault on all those uneducated "havers", how about teaching the locals within a two mile radius of her precious "brood" some practices that have worked for her in the past. I'm sure these new hobbyists would be open to learning and would welcome practicing innovative methods for combating pests in the hive.

It is easy to review your personal practices and then sit back and blame everyone else for your failures. Taking personal responsibility for our own actions is a trait often in the minority these days. Sorry Vicki, I too am "weary" of those passing judgement on anyone's motives who are not pure – and of individuals who don't subscribe to "kumbaya" – such as you!

Kevin Weber
Waynesburg, OH

Loves Bee Culture

I just wanted to let you know that I love *Bee Culture*! What a stellar example of a useful, informative online magazine!

Keep up the great work.

Anya

Mosquito Control Effects

Has anyone written anything relative to the effect of *bacillus thuringenisus* (berliner) on bee larvae? I was wondering if the application of this "biological" mosquito control in standing water could result in the demise of bee larvae if the "treated" water were to be taken to the hive by worker bees for cooling and hydration of the colony?

Warren Potter

***Editor**: Good question. If you have any information on this please send it along.*

Hauling Packages

People have asked about my trip to Ga. to pick up packages. Thanks to all who offered advice. Ultimately, I didn't decide what I was going to do until I got to the UHaul place. I had decided to rent a dual-axil open trailer and billy-bob a box around the packages for the return trip. But when I looked at a closed trailer, things seemed infinitely simpler to go with the box trailer, load the packages and drive with the back cargo door open. I would have preferred more ventilation but advice was the open door would be sufficient. And the cargo trailer was available for a 1-way rental for less than $330.

So my copilot and I took two days to drive from Albany, NY to S. GA. First day got us to somewhere in South Carolina. It was a pleasant, though long drive. The pleasant part was watching "Spring" progress as we travelled south. Leaving New York, daffodils were just blooming. By the time we got to Pennsylvania, dandelions were in full bloom, and they were in seed when we hit Maryland. Redbud and dogwood were magnificent in Virginia and

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the Carolinas! We made it to somewhere in South Carolina on day 1 (7AM to 9:30PM) and we stopped for the night.

We were on the road the next morning by 7AM, and made it to our destination around 3PM, stopping only for fuel, food, restroom and once to buy obligatory Georgia Pecans! I would have loved to stop at the Uncle Remus Museum, but the schedule was tight. Original plans were to spend the night in Georgia, load early in the morning and head back. But we were offered the option to load that afternoon and head back that evening. It seemed a better plan to travel at night than during the day, so we were loaded and on our way by 6PM. I had a wireless indoor/outdoor thermometer to monitor temperature in the trailer. Temp would rise disconcertingly when we stopped; a few degrees in five minutes! So we were anxious to keep moving, and we did, stopping only for fuel and bathroom breaks. The only SNAFU we hit was we discovered that the trailer lights gave out somewhere on the road. We discovered this about 3AM at a fuel stop. Fortunately, the emergency flashers worked, so we drove with flashers until sunrise. It was also very interesting sharing the highway with the overnight trucker culture. It's something I've never thought about, I like to sleep at night and we were also on the trucker's routes. It is common for rigs to simply pull over at rest areas and exit/entrance ramps to sleep. We had to drive on, taking three hour shifts, although the passenger shift wasn't very restful.

Anyway, other than the lights, the trip was uneventful. Wasn't totally comfortable hauling the trailer, and was amazed at the amount of traffic at the time we were traveling. But it was good that the majority of our trip was at night; the bees traveled better with the night time temperatures. We left GA around 6PM and arrived at my house around 4PM. Loading and leaving at 6PM turned out to be a better plan, but we hadn't planned on driving from 7AM Wed to 4PM Thurs non-stop. Grueling!

But the bees travelled fairly well; two packages were not salable upon arrival, but two out of 185 wasn't bad. I guess the best part was an overall successful adventure and exposure to the trucking culture. It made me appreciate a phenomenon that I very much take for granted.

Aaron Morris
NY

Confederate Jasmine/ Bee Trap

Hello, I bought a Confederate jasmine (*trachelospermum jasminodes*) shrub from Lowes, and immediately returned it the next day. Several honeybees had their proboscis stuck/trapped down inside the style/center of the five petaled white flower. The bees were loudly buzzing and buzzing and trying very hard to pull their proboscis out of the flower style. But they were trapped! The flower style was acting like a venus fly trap and the bees could not free themselves. I was able to free one honey bee, but the rest died with their proboscis still trapped.

Has anyone else reported this happening to honey bees?

(P.S. To free the bee, I snipped off the flower from its stem, held the flower with a tweezer and used another tweezer to tear the petal & style apart, didn't work, so I used a sewing needle to tear the petal and style apart so the bee could pull it's proboscis out and fly away. It took about 15 minutes of gently tearing the petals and style away. Too late to save the others.) This plant should be banned!

C. England

Climate Change Debate

I disagree profoundly with the letter from Jerry S. in the June issue in which he denies that the crisis of rapid climate change is being caused by human activity.

With his denial, he disagrees with the 97 percent of climate scientists who believe that climate change is human caused. He disagrees with leaders of the 191 world states and the European Union who signed the Paris Climate Accord designed to reduce human contributions to climate change. He disagrees with the Union of Concerned Scientists, with the American Association for the Advancement of Sciences, with the National Academy of Sciences, with the Intergovernmental Panel on Climate Change, with the leaders of major corporations like Hewlett Packard and Microsoft, with Pope Francis. At least he's got a few talk radio mavens and some Fox News talking heads on his side.

He brings out all of the same illogical arguments of those who do not think that humans are causing climate change and he ends by giving us a clue to his politics when he goes on about money going into the pockets of the government.

He even throws in a couple of sentences about refrigerant gases (which by the way, he gets wrong. CFC gases, chlorofluorocarbons, were banned because of their destructive effects on the ozone layer and were replaced by HFCs, hydrofluorocarbons, which are much more benign. Those regulations have worked quite well).

I wonder if he also denies that tobacco use contributes to cancer deaths – as does exposure to asbestos. I wonder if he denies that lead in paint and drinking water are poisonous. I wonder if he denies that *Varroa* mites cause losses of our bee colonies.

Although it is easy to pick apart Jerry's arguments, the issue is much more serious than whom to believe about the cause of climate change. If the overwhelming evidence is correct, the earth's people and their societies face an immediate threat to their very existence, to OUR very existence. Human caused climate change is not a political football to be debated on Twitter, Facebook, and news programs, or denied by demagogues seeking political power. It is the greatest crisis that our species has ever encountered. And addressing it is a moral imperative, a call to action, not just by governments and other organizations but by each one of us. To turn away in denial in the face of such evidence is immoral. During WWII, governments turned away in denial from the Holocaust, and the result was the deaths of millions. To turn away in denial about human-caused global warming will result in the deaths of billions.

We each must take action and bear witness – by writing to our elected officials, by speaking to our neighbors, by voting for candidates who understand the urgency of the problem, by sending letters to the editor of newspapers and magazines. We have a moral responsibility to our children, to our civilizations, to our natural world. To turn away from that responsibility is to commit a sin that will resonate through the ages to come.

Tom Chester
Tucson, AZ

In My Opinion

Bees & Pesticides & Facts

It was with great chagrin that I read the article "politics of killing bees" and unfortunately I was not surprised about the uniformed and alarmist tone taken. The main thing one should take away from that article was the title, "politics" as the author is using politics to get you to follow her side of the story. In this case that may end up being very damaging to bees and other beneficial insects. We need to be much more informed and cautious with our choices. Almost everything she touches on could be a full length article, but for the sake of brevity I will touch on the one she was really after.

First off, for the sake of disclosure, I live in central IL, we use more pesticides than you can imagine, I am surrounded by corn and beans, and I run 600-1000 hives, all of which are on farm ground and surrounded by crops. I don't live in the east coast, and I am not a "creative facilitator" I am a beekeeper. If you want advice on beekeeping, I can help you, want information on farming, no problem, as for writing and being a political activist, or help on your taxes, not really my game, and I only undertake it here because the downside of what is proposed will in my opinion at the moment do great more harm than good.

In this edition she points out that in 1970 there were five million hives, and now we are down to 2.6 million. What she doesn't tell you is why. It's not from pesticides, it's from social economics. Sugar is cheaper, there are in fact less farmers, and last but not least beekeeping is hard work, with little reward. The honest truth is anyone who wants bees can get them! Until this last "crisis" package bees were so cheap many beeks killed bees in the Winter and bought new ones in Spring! We don't have a crisis of missing bees, we have missing beekeepers! Now that there is interest again, beekeeper numbers are climbing.

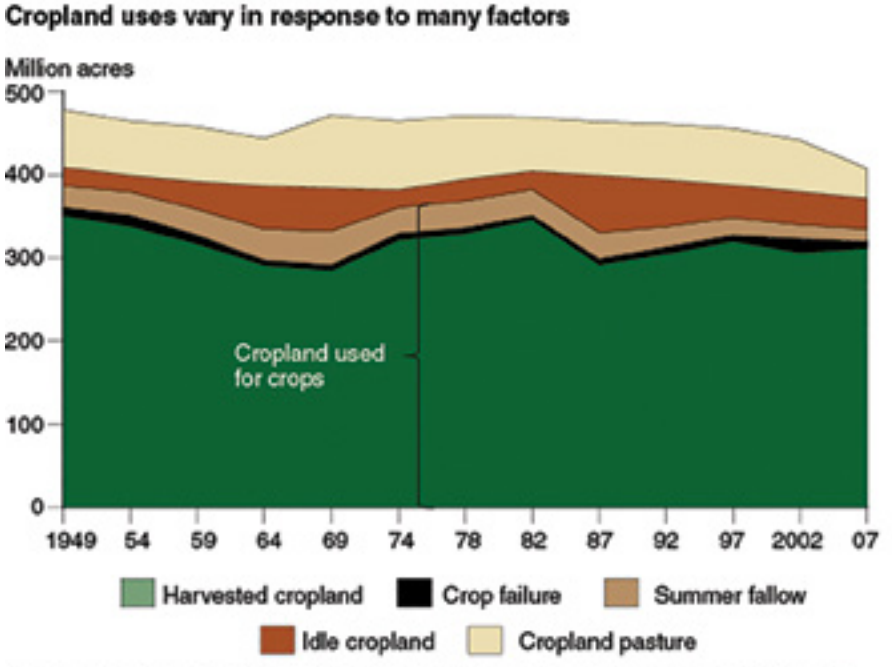
She also emphasized the EPA role to protect "human" health. Interesting and partial true, but our EPA officials work very hard at protecting the environment, at all levels, and to elude otherwise is very deceptive. Sure they make mistakes, but they are our organization doing our work to the best of their ability. To project some perceived failure on them is at best disingenuous. We as beekeepers should look at the EPA as our friends and work with them, not file suits and play political games, the comment was made, "we are a litigious society" we don't need to be except to line the coffers of law firms, but I digress, back to pesticides.

One of the problems we have is that our farming system is so efficient that less than 1% of us are actually involved in farming. That leads to a lot of ignorance by the common person. Unfortunately many are taking advantage of that and trying to mislead you. As a beekeeper I think it's key that we get our facts and science right, and not be played and dragged into a political activist game plan. I want us to be better beekeepers, not used as pawns in a political game.

Before I point out the many misleading points I will tell you with no hesitation pesticides are bad for bees. No one has ever said that pesticides are great for bees. Any attempts that help reduce both amounts and exposures are a great thing, as long as it doesn't come with other hidden costs we don't think about.

That said why are pesticides important? Because their use is actually good for bees and humans! Part 1 of the article expressed the need for more habitats. (Including invasive plants?) Well hard to argue that concept in general. But how do we get there? In the U.S. we farm to feed the world. In 1970 we farmed about 490 million acres and fed 220 million people today we farm 450 million acres and feed 330 million who live an average of 18 years longer, how do we do that? By being better at what we do. The use of pesticides (pesticides actually means fungicides, herbicides and insecticides lumped together). So with the use of pesticides we have returned an average of almost a million acres a year back to habitat! All the while feeding more people who live longer, with the lowest cost of food of anywhere in the world or in history. Pesticides do that.

POINT: use of pesticides allows us to farm less land and produce more food, with



Source: USDA, Economic Research Service calculations based on data from *Major Uses of Land in the United States, 2007*.

USDA puts data out every 10 years, this year is due for updates, conversations with them indicate the trend of decline in land use has continued.

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She carefully avoids fungicides and herbicides, which are the big use pesticides, the reason she did that is the article is a hit piece on neonics, for the moment I will also avoid them. You're provided a fair summary of early pesticides, but she misses many such as Pencap M and arsenic which were a huge issue for bees. Not much mention of all the problems with the early pesticides. Her goal was to get to neonics and EPA rules and she didn't waste much time. But she did mislead you a lot.

First off, she points out neonics are systemic. That's 100% correct! But let's study that comment. First off you need to understand what the "old system" was/is. That would be an insecticide sprayed "in furrow" as the seed is planted. This spray was pretty well targeted, but still had a lot of drift involved. This would be then followed up six to 10 days later with a post emergency spray, when the plant is most vulnerable yet. This is an above ground foliar spray with a lot of drift. Then there was hopefully the last spray, that would be preventive, just before the plants canopy and it got too hard to drive thru without damaging a lot of crop. So that's three, yes three applications of foliar sprays that covered everything in that field! And I mean everything. THEN many times there was a 4th spray if insecticide usually aerial as now we can't drive on the crops. Ever see that done?? Everything is covered. . . Horrid actually if you lived in the area you would understand as a beekeeper you looked at crop dusters like they were the German planes headed to France. Please understand these are/were organophosphates, Pyrethroids and sometimes carbaryls. They kill about everything in the insect world.

Sometime in the past a bunch of super smart guys were sitting around at lunch and came up with an idea to save the non target insects . . . I envision this huge light bulb on someone who said, "what if we could just target the bugs that eat our target plant?" I am quite sure everyone looked at him like he had lost his mind, but danged if they didn't do it.

There is also another key point here. When switching to a seed company applied pesticide, we remove another huge variable. When each individual applied pesticides, there is a lot of "a little more can't hurt" thought process and a lot of drift and overspray due to bad conditions. All of that vanishes. Seed companies have a strong incentive to apply as little as practical and large batches are much better controlled.

POINT: neonics are extremely targeted and application levels well controlled.

Neonics are coating the seed, the most vulnerable part and the time frame is when the plant is young. So protect the seed and the seedling. But let's now get to that word "systemic" that means it's in the plant as it grows, as the plant is tiny the dosage is strong, but what is not mentioned is that as that plant grows and is exposed to sunlight, the level is very much diluted and it decays. By the time most plants such as corn and beans are flowering, it's a tiny level. Take OSR or Canola for example. While seeds are coated, it's not uncommon to have insect infestations on plants even with treated seeds. What's happened is time and plant growth have diluted it enough not all the pest are controlled.

Let's stay with systemic for a moment and talk about the number one farmed honey plant in the world, oil seed rape/Canola or just Rapeseed. Neonics have been used on this crop for well over a decade the plant is as far as biomass is concerned, fairly small. Yet we have ZERO evidence that shows neonics in this crop are an issue. In fact any beekeeper TRIES to find this one. Some will cite the ban in the EU. Before you do that, check your facts, foliar sprays are way up, the ban was actually a partial ban and beeks overall have not seen any improvements. Canola is a huge honey crop in Canada, and even here in the U.S. I myself have run it for several years, and can tell you bees do FANTASTIC on it, pollen and nectar in copious amounts, and no losses of bees or queens from Neonics. Sometimes the Warrior sprayed can have some effect, but we hope it's not needed.

"While laboratory experiments have clearly established the potential for both lethal and sublethal effects of neonicotinoids on individual bees (Cresswell 2011; Blacquière et al. 2012; Godfray et al. 2014), field studies have often failed to detect colony-level effects (Cutler & Scott-Dupree 2007; Nguyen et al. 2009; Pohorecka et al. 2012; 2013; Pilling et al. 2013; Cutler et al. 2014; Rundlöf et al. 2015)"

Let's talk about corn. I am surrounded by it, so it's close to me in many ways. That plant is generally around six feet tall and weighs around 3lbs by the time it produces pollen. The amount of neonics left in the plant is diluted to a huge amount. It produces no nectar, just pollen. It produces pollen for about five day's pollen in millions of tons, and yet very few insects use it, those that do have not been shown to suffer effects. Katherine carefully cites a study where 40% of the pollen in traps is corn. Check those facts. Ohio and Iowa Universities both have studies that show around 10% of the bees diet is corn pollen for roughly a 10 day period. Number of hives killed or damaged by that? Zero. No cases of bees dead from corn pollen? How can that be?? Follow along, if corn pollen is a problem, IN, IL, OH, IA, NE, KS TX, MI, MN, and ND would all be wastelands for bees. And yet when you look at honey production numbers you get a whole different story. Bees on corn pollen are no different than us on Junk food. Rest assured though, you will be told of the "sub-lethal effects" in other words, we have no evidence, but we still want you to believe. Our bees live six weeks in Summer, do we really think that killed our hive the following Feb??

"J. Agric. Food Chem., Vol. 53, No. 13, 2005" has a great article showing real world data despite the goal to show how bad contaminated pollen was, actual data show low levels of exposure. You also have to remember, these exposure windows are short. Great for bees? No, but in my opinion much better than the options.

Let's talk a second about planter dust; I don't want to mislead you like others do. There are some cases of planter dust issues. It's based in what is dry ground and dust drift from the seed lubricant. There are some fixes in place and in the works, but it's a very localized and seasonal issue. Here in IL we keep 1000s of hives right next to corn fields and I don't know of anyone who has had an issue around me. In fairness our soil is usually very moist. More problematic is the in trench sprays. We do need to keep our eyes open

and monitor for issues. For what its worth, Douglas Sponsler has a great dissertation on this topic and is well worth the read. One thing he points out is that the timing of burn down (application of roundup) can greatly affect exposure to planting dust. If fields are burned down or tilled before planting to reduce attractive plants, exposure is lessened.

Lets mention soybeans, another neonics coated seed and the other major crop around me. Sometimes a big nectar plant, in fact at times we get a honey crop from it. The number of dead bees from neonics in beans is zero. Not true of Pyrethroid sprays for beans. I used to lose hives to that every year. Sheets were kept in the truck for those calls "Hey were going to spray" I went out and covered the hives as best I could. It's been well over 10 years since I did that.

Many will cite the increase in Neonics. NONE will also show you the decrease in its alternatives. That is the intellectual dishonesty of politics on display. When you see one number and not the other you should cringe. Even the Pesticide Action Network shows this reduction on their front page, kudos for that.

We also see a lot of the foolish term "prophylactic" or "unnecessary" or IPM. Bet cash money when they say this, they are not involved and have no stake in the business of growing things. Every single one of these pesticides cost cash money, lots of it. Farming is not a profit center. It takes millions to do, and return on investment is tiny and tight. Every season about 1.5 million farmers sit down with pencil and paper and do the math, and come up with the right answers for their fields, IPM such as waiting for root worm damage to exceed a threshold, can cost huge portions of crops, and the last minute fix for flea beetles? Air sprayed Pyrethroids that kill everything in the field.

Pesticides can be hard on bees, but that's not the real point. Gasoline is bad for bees and we use it every day, so are 1000's of other things. What matters are the pesticides bees are exposed to. Modern farming and neonics are a huge improvement over the old ways. They are a quantum leap in targeted technology. That doesn't mean we don't keep our eyes open, it means simply get all the facts first, let's quit letting Washington politics and community organizers play loose with the facts. Right now we are being fed garbage. Every single bad thing is played up, Katherine used a common media tactic, fear mongering, be better than that. When it comes to farm chemicals, fear is not our friend, information is.

Remember the term "dosage makes the poison." I just got my test back from USDA. I am lucky enough to send samples for analysis every year. My hives were run in Canola in May, corn and beans the rest of the season, as well as some cranberries this last year. Pollen samples taken in AUG (when corn just finished and beans are making honey show NO, read that ZERO, detectable levels of pesticides. It did pick up the thymol used for mites last Fall, but that's it!

Read further into the data they send back with the report, what you find is they found most samples came back with one or two pesticides, 42% of which are beekeeper applied. DIG further and find out of the insecticides found, neonics make up about 5% the dangerous three make up the other 15% of insecticides found. Now I am horrible at math, but even with that I am smart enough to know that 15 is bigger than five and eliminating that five is going to make the 15 get even bigger.

Every single day these farmers do the math and try new things. Some are trying more organic methods (not pesticide free but organic pesticides) some are doing more rotations, or no till. Every single one is trying to do better for more yields with less input or damage to non target species every year. Let's quit sitting around second guessing them, and start asking. We as beekeepers are part of the AG picture, let's get our facts and thought straight before we fly off to DC.

I am well aware that some of you will be greatly offended, I can't reach you. But many of us are fair minded and looking for information. Those of you are the ones we need leading the charge, not the chicken little's of our group. What we need here is a bit more fair and balanced information we as part of the AG community need to do better at it. BC

Charles Linder

Table 3.3. Share of U.S. Conventional Pesticide Active Ingredient Usage in the Agricultural and Non-Agricultural Market Sectors: 2012, 2009, 2007, and 2005 Estimates

Year	U. S.	Agricultural Market Sector		Non-Agricultural Market Sector	
	Mil lbs	Mil lbs	% of U.S.	Mil lbs	% of U.S.
2012	854	762	89	92	11
2009	735	649	88	86	12
2007*	726	639	88	87	12
2005*	693	606	87	87	13

Source: EPA estimates based on Table 3.2.

Note: Table data excludes sulfur and oil, other chemicals used as pesticides (e.g., sulfuric acid and insect repellents), as well as wood preservatives, specialty biocides, and chlorine/hypochlorites.

* Updated values for 2007 and 2005 presented for continuity.

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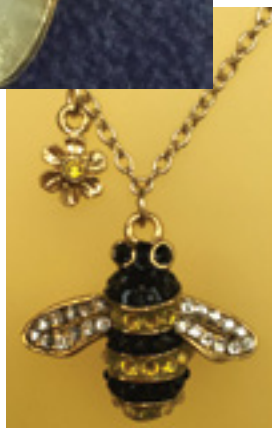
DANIELLE'S BEE

Hello bee lovers! My name is Emily Austin. I have been designing jewelry for the past 24 years in Scottsdale, Arizona, specializing in hand setting tiny Swarovski crystals in my pieces.

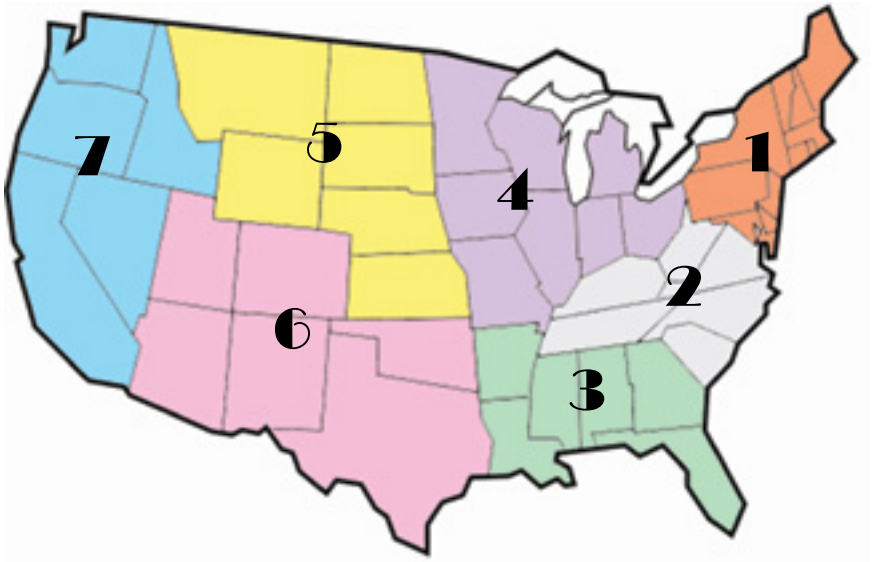
Several months ago friends of mine lost one of their lovely daughters who was just 21 years old in a tragic accident. Her name was Danielle Côte, a beautiful young lady inside and out who loved the birds, bees, flowers and trees. She worked at a nursery and was very involved in spreading the importance of saving the bees and the planet.

When Danielle's family asked me if I made a bee necklace, I knew I had to do something. Therefore, I designed a bee to comfort her family and help raise money and awareness in Danielle's name. Every bee necklace is made by hand with sterling silver (over plated with rhodium to prevent tarnishing) or gold fill chain and gold vermeil charms. You may choose your favorite Swarovski crystal color in the center of the flower charm. The bee pendant sells on my website for $95. Fifteen dollars of each necklace will be immediately donated to your favorite bee or gardening organization. Thank you.

Please visit my website for ordering information: **https://www.emilyaustin.com/ProductDetails.asp?ProductCode=bee**



JULY – REGIONAL HONEY PRICE REPORT



Honey Label Use

We took a look at honey jar labels this month, seeing what our reporters use, and don't use. Perhaps you will see something here that will help promote your honey while just sitting on a shelf or farm market table.

A Product Of The USA label helps define the origin of the honey in the bottle, and, while most of us sell in local markets, there are beekeepers who, to round out their product line bring in honeys from other places. Only 27% of our reporters seem to have an issue with that and don't use a USA label.

But what about a Local Honey label? Well, there's a difference, but not as much as we expected certainly. Local is the King of the best honey there is, but only 52% use a Local on the label.

Many, but not most, sell a varietal honey in some location and add that to their label mix. If you have something as special as Sourwood, Locust or Sunflower, touting it to your customers is a plus and enables you to add a bit to the price because of the extra work involved. 30% of our reporters take advantage of that fact. But even if you can't demonstrate a particular floral source, segregating out a seasonal harvest gives your customers a chance to come back and ask for that Fall honey I got last time, or the wonderful Spring Bouquet like last years crop. But only 15% use a seasonal label. If you don't you might consider that name, instead of the far-to-typical Wildflower so many of us use.

If your honey is sold at a farm market, what does the customer see? The top of the bottle. Even in many stores the honey is located such that the customer is looking at the top, so something there should help, right? Only 32% or our reporters use a top label, but we didn't ask whether that was because that's all that they sell there, or they didn't want one.

Other promotional tactics used included the locations of the apiary where the honey was made, that the honey wasn't filtered and indeed did contain pollen, Raw Honey is a common attribute used by beekeepers to indicate strained and not filtered and not heated above 100, how to get honey back to liquid form is common, and good, as is 100% Pure and Natural, though Natural doesn't have an official meaning yet. Certified Naturally Grown shows up on occasion, as do honey tags and 'About Us' info. We also asked the obvious, just to make sure. 96% put contact information on the label because in most places it's the law. But some sales outlets aren't that fussy. We also asked about the weight of the container in pounds and grams. 91% use that, but grams seems to be the difference here. Some don't. And what about that Don't Feed Infants you see so much? Only16% put that on their labels, since it isn't the law, and it is generally considered not a problem, and it is an extra expense.

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7				Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								Range	Avg.	$/lb		
55 Gal. Drum, Light	1.50	2.06	2.29	2.53	2.37	2.26	2.80	1.50-3.40	2.30	2.30	2.25	2.19
55 Gal. Drum, Ambr	1.35	2.02	2.04	2.55	2.28	2.16	2.80	1.35-3.35	2.22	2.22	2.17	2.06
60# Light (retail)	216.67	188.88	211.67	195.95	211.19	185.74	246.67	131.71-300.00	206.52	3.44	202.99	203.74
60# Amber (retail)	216.25	186.45	197.50	191.35	207.07	186.71	246.67	125.71-300.00	201.29	3.35	196.55	200.47
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	89.68	74.40	88.85	60.00	88.56	87.60	144.00	57.60-144.00	88.92	7.41	88.81	80.42
1# 24/case	125.34	106.30	124.76	103.87	148.00	134.04	230.00	86.40-230.00	124.54	5.19	126.09	119.27
2# 12/case	111.08	95.00	110.57	100.64	110.76	101.60	180.00	78.00-182.40	109.02	4.54	114.81	110.42
12.oz. Plas. 24/cs	110.85	80.80	101.00	84.40	114.55	105.00	138.00	66.00-192.00	100.10	5.56	100.91	95.06
5# 6/case	138.67	107.25	154.35	109.60	133.17	120.72	180.00	71.50-206.00	127.59	4.25	127.63	117.16
Quarts 12/case	197.53	125.07	135.84	123.60	185.00	155.59	186.00	85.00-325.00	150.02	4.17	146.43	135.48
Pints 12/case	116.43	80.49	78.20	108.33	111.00	76.32	102.00	60.00-180.00	93.52	5.20	92.42	83.11
RETAIL SHELF PRICES												
1/2#	5.25	4.06	4.70	4.25	3.47	4.43	7.00	1.93-7.50	4.66	9.32	4.77	4.57
12 oz. Plastic	6.19	4.83	5.11	5.31	4.49	6.18	6.85	3.00-9.50	5.59	7.45	5.99	5.64
1# Glass/Plastic	7.38	7.08	7.26	6.50	6.10	7.07	10.00	3.00-12.00	7.15	7.15	7.43	7.11
2# Glass/Plastic	12.62	12.16	12.24	11.53	10.33	11.13	18.25	6.00-21.50	12.25	6.13	12.04	12.03
Pint	12.79	8.62	9.37	12.44	8.30	10.12	9.95	4.00-18.80	10.02	6.68	9.78	9.91
Quart	18.90	15.79	16.09	16.63	15.10	17.67	19.73	8.00-31.00	16.95	5.65	16.61	15.82
5# Glass/Plastic	26.28	25.19	33.00	24.65	21.63	24.82	35.00	14.48-41.00	26.04	5.21	26.40	26.22
1# Cream	9.62	8.16	8.63	7.28	11.27	6.06	12.00	5.50-16.00	8.82	8.82	9.43	9.17
1# Cut Comb	12.79	9.00	7.75	9.79	8.50	9.50	20.00	5.00-22.00	10.62	10.62	11.34	10.67
Ross Round	9.41	6.75	8.77	10.00	8.77	8.83	8.40	6.00-11.95	8.57	11.42	9.02	8.70
Wholesale Wax (Lt)	7.56	4.88	5.60	5.22	6.83	6.11	5.42	3.00-12.00	6.17	-	6.02	6.35
Wholesale Wax (Dk)	7.21	4.56	4.28	4.53	6.19	3.80	5.63	2.00-12.00	5.38	-	5.01	5.42
Pollination Fee/Col.	99.29	66.25	51.67	76.67	80.00	115.00	197.50	30.00-200.00	94.13	-	93.48	84.50

WAS 40th anniversary conference comes home to UC-Davis in September!

Join the Western Apicultural Society (WAS) for their 40th Annual Conference this September 5 - 8, back where it all began at the University of California, Davis. Enjoy the northern California sunshine, on-campus bee garden and all the 'bee culture' places, events and people that have been drawn to the Davis area over the years. Mix and mingle at the Bee Buzz Social the evening before the conference begins, hear excellent speakers talk about the latest science has to offer the beekeeping industry, with plenty of time to visit with other beekeepers from all over North America.

For those not familiar with us, WAS is a registered non-profit, educational organization with specific interests in western North America (though we have members from all over). Created in 1977 to address the then-unmet needs of small-scale beekeepers, the 2017 version of WAS continues to take care of those needs at the same time it acknowledges and remains inclusive of the commercials. New research, which is the basis of the conference and, by extension, the WAS Journal, is not exclusive to either end of the spectrum. Nor do you need to be a WAS member to join us at the conference.

President Dr. Eric Mussen is a retired entomologist from UC-Davis and still the top 'go-to bee guy' in North America. He is organizing the conference to take advantage of the great resources offered on-campus. Other Davis entomologists - Drs. Elina Niño, Brian Johnson, Rachel Vannette, Neal Williams and Robbin Thorp - are expected to be speaking on their specialties, which include molecular studies, varroa control products, pesticide issues, and work on the succession of microbial turnover in flower nectars as the bloom period progresses. Dr. Thorp, now retired also, specializes in native bees, especially bumblebees. Serge Labesque, a Glen Ellen CA beekeeper originally from France, is "cemented in" as the lead-off speaker. Serge espouses selecting local stock to keep his bee colonies strong and is widely recognized for his immaculate beekeeping and his extraordinary teaching skills. Though they don't agree on all details, Serge and Eric are good friends and each respects the other's expertise.

Conference week will include tours to a major beekeeping supply outlet and a local, specialty-honey packing operation - and look for some special events marking the 40th anniversary. Dr. Mussen was the first WAS vice president way-back-when and the first president, Dr. Norm Gary, a well-known Davis "character", will also be participating. Expect some fun!

Watch the website (www.westernapiculturalsociety.org) for more details as they become available.

Bee on California poppy - California's state flower. Photo by Kathy Keatley Garvey

INNER COVER

It started out as a typical hectic Spring. Then it got worse. Then it got real worse. Worse, as in things kept happening that kept us from getting done what we wanted to get done, too. You know what I mean?

The weather was the main villain. Actually, the timing was the problem. You have to have rain, but really, I had to build an ark to get to the back bees. Squish, squish, squish. The mower needed pontoons. The garden was nowhere to be seen. Whenever something of value started to bloom – take your pick – locust, clover, maples, it got cold, it rained and what would have been a crop, wasn't.

That wasn't as bad as it sounds because most hives didn't have enough boxes to accommodate a crop had there been one. Getting boxes on was a 'not-gonna-happen' task anyway. When I had time to dig them out, get them ready and head out – it was raining, it was way, way cold, or it was dark.

Packages got put in on a fine, sunny warm day – the one and only for 10 days – and by the time we got back to them – two road trips, lots of rain, a couple of deadlines, making up for an employee who changed jobs, and on and on, they had, for the most part gone to heck. It wasn't food, they had plenty of leftover honey, some pollen and there was certainly lots of water everywhere. What went wrong mostly was that the queens either got out early because the corks weren't tight, or, they didn't get out for way too long. As a result, the early releases all killed their queen, and the late releases ran out of bees before she started laying well. Queenless, or beeless was the name of the game.

All of this is fixable of course. Load up with some brood, requeen, shake some bees. Just as soon as it quits raining, and when I get home, I'll get right to it.

We'd made splits earlier from overwintered colonies bursting at the seams. Lots of bees, lots of brood, lots of food. Honey food, not feeders food. Stored pollen food, not patty food. Lots and lots. Then the monsoons came. The plan, yes there was a plan, was to let them raise their own, keep tabs on the cells, and when sealed either remove, or use as emergency queens for hives in trouble, and then install a new queen of chosen genetics in the split or the needy colonies. That was the plan. A queenless period to give *Varroa* a shot. It had always worked in the past. Everytime. Of course that didn't work. We were either gone, or stuck inside behind the snowbanks and ocean of a lawn and those splits were on their own. And, of course, the queens emerged. And, of course, there wasn't day one they could fly during that critical time. And, of course, they didn't get mated. And, of course, we now have boxes full of drones. Well, mostly drones. No brood to speak of, so not sure where all the drones came from, though we both probably know where from. So, requeening those will be interesting.

Another colony had spent the Winter as a four tall, five frame box colony. I wanted to see how to make that work. What with the mild Winter here they did just fine. They started in the bottom two boxes and actually ended up in boxes two and three, and were dining in box four by the time I got to them this Spring. OK, that worked, and I learned a couple of things, but I needed those five frame boxes for other splits (see above) so transferred them to my regular eight framers. Not a problem, I thought.

There was confusion of course. More than I should have let happen I suppose. I turned the entrance 90° because the front door was pointing in a bad lawn mower direction (which as it turns out wasn't much of a problem, see above), and raised it a bit higher on cinder blocks. So, most of the bees were fine with that. In and out, in and out, just a different in, but that's OK. But some of them, maybe stubborn, maybe not the brightest bees in the bunch, maybe smarter than I think, decided that the old door was the best door, and they weren't going to change. So, they started using the space underneath the colony, filling it with comb and clustering there. Of course there's no brood – that queen didn't move – so they built comb, clustered, and are filling much of it with honey. And there they are, filling all the empty space beneath the colony between the blocks and in the empty spaces within the blocks. It's solid comb, bees and honey. And even by mid-June, no place to go, so there they sit. I'll get to them just as soon as it quits raining and warms up. Really.

Then there's the garden, deck and landscape chores each Spring. The garden starts in the basement in January when the seeds go in, and spreads out all over under lights until it's warm enough to bring them outside. Tomatoes, peppers, herbs, you know, the regular suspects. By the time they've gone through two moves up – to bigger containers – I'll have about 20 flats worth of plants and that's when they go up to the deck and into that portable greenhouse I have out there just for this. That lasts a couple three weeks, then outside

Gardens, Bees, Chickens, Kids.
Greenfield, Mass.

into the cold, cruel world. Yup. Cold. Yup, cruel. Yup, too much rain. So much it washed potting mix right out of the pots. There wasn't time to repot, so I just dumped more mix right on top of the flats and washed it in. It kind of worked.

Meanwhile, all the rest of the world needed working on. New chicks meant rearranging the coop, different kind of feed, more water, different doors, different chores. The garage goes away about the first of March because it gets filled with pots and dirt and tools and feed and fertilizer and the lawn mower and gas cans and getting ready bee stuff and putting away bee stuff and inbetween bee stuff. So it's a no brainer to leave the car outside.

So when you walk into the garage there's all this stuff. And it's stuff that needs done. So you grab the shovel to put it back where it belongs and trip over the chick waterer that needs filling and go to fill that because chicks need water and get to the faucet and remember you didn't water the tomato and pepper plants you were heading for when you saw the tipped over Jade plant, right on the asparagus sets that are up in the pots but it's too wet to get them in the ground, but you thought you'd try and see and that's where the shovel comes in. So after all that, nothing is done yet. And the chicks still need water. And that's what it's been like. Careening from one disaster to another, not enough time or light to get one thing done when another, need-more-attention task rears its ugly head.

So we have one cool, cloudy, feels like it's going to rain evening after work, finally. Bees are as caught up as can be for the moment. Garden time. Get in some rows of beans, five kinds. Three kinds of Summer squash. Two kinds of cukes. Didn't get to the greens yet. Got more beans but they go in later. Got the tomato supports up, enough for 72 plants, plus the bunches in pots on the deck. Eleven kinds all told and one gets 10 feet tall. Got the pepper row spaces ready for two long rows for about 75 plants. Ten kinds of peppers. Except I forgot to get regular green peppers. Red, gold, black, yellow, huge brown peppers, little tiny peppers. They all go in the garden. The hot ones, they stay on the deck. Eight kinds of those. One, I've never heard of, about 10 million on the Scoville scale I'm told. I don't touch these. Food shouldn't hurt, but I have friends that love them. So we share honey and eggs and tomatoes and peppers and beans with friends who don't garden, chicken or bee.

Next day. Back to the bees. Queens are coming. Not one, two. But that morning I'm heading out to Oregon for a daughter visit and move and roadtrip home. Be gone maybe a week. Look at the weather app on my phone. It looks like six days of warm sunny weather. It's all yours Kath until I get back and can help. If it doesn't rain. And stays warm.

•

One of the weekends we were gone was that trip to Greenfield I talked about last time. I did get to talk in L.L. Langstroth's Church, walk his grounds, visit the memorial, view the building that was the home of the girl's school he taught at. And had my picture taken in his pulpit. Plus, I got to meet the former Governor of Massachusetts, listen to the Apiary Inspector of the state and a couple of Scientists looking at honey bee forage issues at UMASS.

Somebody asked me if that wasn't a Bucket List sort of experience. I mean, walking in the footsteps of the most revered man in the history of our industry? The Minister who made all this happen?

I had to think about that for only a split second. How could it be? How could one imagine doing that, let alone making a list and putting it, what, first or second, of the things I want to do before I die? No, it wasn't that at all. It was a once in a lifetime, totally unexpected, wonderful opportunity that I wouldn't have passed up on ever. It wasn't something I wished for. It's something I'm glad I got to do.

It's Summer time. Bees to work, gardens to make, daughters to move. So keep your smoker lit, your veil tight, your hive tool handy and your guest room ready. It only gets better from here.

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It's Summers Time –

Swarms, Chicken Bullying and Bee Fest

We've had a busy, but fun and exciting late Spring and early Summer. I have lots to talk about this month, so I'll hit the highlights.

If you are a fan of the Kim and Jim show webinars that *Bee Culture* has been offering, then you know that in May they tried to do something new – move it outdoors. I'm pretty sure we got all of the bugs worked out here in Medina and then it rained. While we were outside one day with our IT guy, Johnny, sitting on the steps of the Root family homestead, we witnessed something not uncommon, but remarkable. As Johnny and Kim were working with all of the Ipads and IPhones I noticed a great amount of bees in the air. As I watched closer I realized what was happening. One of the Root hives was getting ready to swarm.

Beekeepers look at swarms differently – some feel it's just what bees are meant too do and don't get to upset about it. Others, want to catch that swarm right away. It took about 10-15 minutes of circling in the air and the swarm landed high in a tree. The maintenance guys here at Root were ready to get a ladder and send our resident beekeeper up in the tree. We vetoed that activity and assured him that the swarm would be gone by the next day. It was.

If you've never gotten to see this I hope someday you do. Regardless of how you feel about swarms it is a site to see.

A couple of weeks ago we had a situation with our older chickens that we hadn't witnessed before. I went out one night to close them in for the night and two of them were just beating the heck out of a third girl. So I scooped her up and isolated her for the night. She wasn't gravely wounded and didn't seem sick. We kept her away from the others for a couple of days and then tried to reintroduce her. The same two chickens came after her chasing her right back into the coop into the corner. None of the others, just those two. Like I said she didn't seem to be sick or wounded.

Getting set up for the 7th Annual Bee Fest at the Second Congregational Church in Greenfield, MA.

If you know chickens, you know they have zero tolerance for the sick and wounded. She didn't appear to be either of those and the fact that the whole flock wasn't going after her was odd. So we tried putting her in with the young girls that are not quite grown. She didn't go after them, but if they approached her she started pecking. Okay so what to do with this chicken – I know some of you are thinking just get rid of her. And that option was starting to look like the only good one. However our neighbor has chickens and Kim happened to bump into her out in the yard and asked if we could try relocating our bird to her flock. Well, they took her in and she has been just fine ever since. Very strange.

The crosswalk leading to the Farmer's Market and the church in Greenfield.

The first weekend in June Kim and I were in Greenfield, MA. This is one of the homes of L.L. Langstroth. If you're new to beekeeping you might not be real familiar with that name. I encourage you to do some reading. L.L. Langstroth is considered the father of American Beekeeping. He was a teacher, a preacher and a beekeeper. He was born in Philadelphia and even lived in Ohio for a while. But a chunk of his life was spent in Greenfield.

L.L. ran a girl's high school and was appointed the pastor of the Second Congregational Church in Greenfield. We were there for the 7th Annual Bee Fest that is held on the grounds of and inside the church. Kim was the keynote speaker for the morning's activities. This year is also the 200th anniversary of the Second Congregational Church.

The church is still very active with around 250 members and seems to do a lot of community service. The building is open everyday from noon until 2:00 p.m. just so folks can come in and rest, pray, meditate or just get out of the weather. It is a beautiful church and I have to believe L.L. would be pleased to know that there is still a flurry of activity going on there.

Kim 'preaching' in L.L. Langstroth's church.

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A Closer LOOK

VIRAL DISEASE SUSCEPTIBILITY AND TRANSMISSION

Clarence **Collison**

Transmission among colonies is a central feature for the epidemiology of honey bee pathogens..

Honey bees are social insects living in densely packed colonies of related individuals. Their homogeneity, in terms of physical environment and genetic composition, and the close contact among nestmates makes them particularly susceptible to disease infections because transmission among individuals within the colony is markedly facilitated in such a setting (Forfert et al. 2016). Not only must honey bee pathogens ensure transmission within the colony (intra-colonial transmission), they must also be transmitted between different colonies (inter-colonial transmission) to maintain themselves in a population (Forfert et al. 2016; Fries and Camazine 2001). This represents a critical step in the life of many honey bee pathogens and pests (Fries and Camazine 2001). Transmission can occur via various routes: 1) the flight of an (infected) drone or worker from its own into another colony (drifting); 2) the return of a worker bee after robbing an infected colony; 3) contact of infected and uninfected workers from different colonies during foraging; 4) contact with infected material from the environment; or 5) sexual contact of infected drones and queen (Fries and Camazine 2001; Yue et al. 2006; Yañez et al. 2012).

Transmission among colonies is a central feature for the epidemiology of honey bee pathogens. High colony abundance may promote transmission among colonies independently of apiary layout, making colony abundance a potentially important parameter determining pathogen prevalence in populations of honey bees. To test this idea, Forfert et al. (2016) sampled male honey bees (drones) from seven distinct drone congregation areas (DCA), and used their genotypes to estimate colony abundance at each site. A multiplex ligation dependent probe amplification assay (MLPA) was used to assess the prevalence of ten viruses, using five common viral targets, in individual drones. There was a significant positive association between colony abundance and number of viral infections. This result highlights the potential importance of high colony abundance for pathogen prevalence, possibly because high population density facilitates pathogen transmission. Pathogen prevalence in drones collected from DCAs may be a useful means of estimating the disease status of a population of honey bees during the mating season, especially for localities with a large number of wild or feral colonies.

Two main routes of chronic bee paralysis virus (CBPV) transmission are known: contact between adult bees when healthy bees are crowded together with infected individuals (Bailey et al. 1983), and spread of infectious particles in the feces of paralyzed bees that are taken up orally by healthy nestmates (Ribiere et al. 2007). Crowded conditions favoring these two routes occur frequently in growing bee colonies during the Spring and early Summer. In experimental studies, bees can be successfully infected by feeding the virus mixed into sugar solution, by topical application of viral particles, or by direct injection (Bailey et al. 1963; Bailey 1965a; Rinderer and Rothenbuhler 1976). Experimentally infected adult bees show symptoms after about five to six days, similar to those of naturally infected bees (Rinderer and Rothenbuhler 1976; Bailey 1965b; Chevin et al. 2012). A higher number of virus particles is needed to infect bees by topical application and by oral infection, as compared to injection (Bailey et al. 1963; Bailey et al. 1983; Bailey 1965b). A recent study showed that CBPV replication was more effective in individual bees inoculated *per os* compared to bees inoculated via the cuticle (Toplak et al. 2013).

Chronic bee paralysis virus (CBPV) is known as a disease of worker honey bees. To investigate pathogenesis of the CBPV on the queen, the sole reproductive individual in a colony, Amiri et al. (2014) conducted experiments regarding the susceptibility of queens to CBPV. Results from susceptibility experiment showed a similar disease progress in the queens compared to worker bees after infection. Infected queens exhibit symptoms by day six post infection and virus levels reach 10^{11} copies per head. In a transmission experiment they showed that social interactions may affect the disease progression. Queens with forced contact to symptomatic worker bees acquired an overt infection with up to 10^{11} virus copies

"Chronic bee paralysis virus (CBPV) is known as a disease of worker honey bees."

per head in six days. In contrast, queens in contact with symptomatic worker bees, but with a chance to receive food from healthy bees outside the cage appeared healthy. The virus loads did not exceed 10^7 in the majority of these queens after nine days. Symptomatic worker bees may transmit sufficient active CBPV particles to the queen through trophallaxis, to cause an overt infection.

Bee viruses (Kashmir bee virus (KBV) and sacbrood virus (SBV)) can potentially be transmitted horizontally via worker secretions. Shen et al. (2005) demonstrated that bee viruses (KBV and SBV) were detected in worker bees, brood food, honey, pollen and royal jelly. These bee viruses may be transmitted from worker bees to larvae or to other adult bees (queen, other workers or drones) via food resources in the colony. It is also possible that bee viruses might be transmitted among colonies by feeding bees the honey or pollen gathered from diseased colonies. This is a practice used by some beekeepers to help colonies survive during times of low flowering. Also, dead or weakened colonies can be raided by worker bees from other colonies and honey and pollen taken back to their colonies. The importance of these food sources in viral transmission between colonies needs to be defined. Support for food being a route of transmission comes from studies done by Bailey (1969), who injected SBV preparations into adult bees and fed SBV to larvae, and then detected viruses in different tissues (head, abdomen, midgut and hypopharyngeal glands) by immunodiffusion. This experiment demonstrated virus in the hypopharyngeal glands of bees that had been injected with or fed SBV. The results also showed that more SBV accumulated in the heads of infected bees than in other regions.

Honey bees can be exposed to several viruses and transmission can occur both horizontally and vertically (Chen et al. 2006; Chen and Siede 2007). In horizontal transmission, viruses are transmitted among individuals of the same generation. Vertical transmission occurs from queens to their offspring and can have two main causes: (I) infected sperm originating from the drones and (II) contaminated eggs originating from infected spermatheca and/or ovaries of the queen. Ravoet et al. (2015) investigated vertical transmission of viruses within a Belgium queen bee breeding program. They found a high prevalence of different honey bee viruses in eggs used in queen breeding operations, with more than 75% of the egg samples being infected with at least one virus. The most abundant viruses were deformed wing virus (DWV) and sacbrood virus (SBV) ($\geq$ 40%), although Lake Sinai virus (LSV) and acute bee paralysis virus (ABPV) were also occasionally detected (between 10-30%). In addition, aphid lethal paralysis strain Brookings, black queen cell virus, chronic bee paralysis virus and *Varroa destructor* Macula-like virus occurred at very low prevalences ($\leq$ 5%).

Amiri et al. (2016) investigated whether sexual transmission during multiple matings of queens is a possible way of obtaining virus infection in queens. In an environment with high prevalence of deformed wing virus, queens were trapped upon their return from natural mating flights. The last drone's endophallus, if present, was removed from the mated queens for deformed wing virus quantification, leading to the detection of high-level infection in three endophalli. After oviposition, viral quantification revealed that seven of the 30 queens had high-level deformed wing virus infections, in all tissues, including the semen stored in the spermathecae. Two groups of either unmated queens with induced egg laying, or queens mated in isolation with drones showing comparatively low deformed wing virus infections served as controls. None of the control queens exhibited high-level viral infections. Their results demonstrate that deformed wing virus infected drones are competitive to mate and able to transmit the virus along with semen, which occasionally leads to queen infections. Virus transmission to queens during mating may be common and can contribute noticeably to queen failure.

Under field conditions, *Varroa jacobsoni* were shown to be highly effective vectors of deformed wing virus (DWV) between bees. Adult female mites obtained from honey bee pupae naturally infected with DWV contained virus titers many times in excess of those found in their hosts and, beyond that, which might be expected from a concentration effect. It is therefore possible that DWV may be capable of replicating within the mite. Bees which tested positive for DWV exhibited characteristic morphological deformity and/or they died during pupation. Asymptomatic bees had much lower virus titers than those which were deformed or had died during pupation. It is therefore suggested that for DWV to cause pathology it must be present in pupae above a certain concentration. The amount of DWV vectored by *V. jacobsoni* will depend on the mites' level of infection, which will in turn depend on whether they had fed previously on dead or deformed bees and also on the rate of replication of the virus within the mites. Consequently, developing bees infested with large numbers of mites could suffer a high incidence of deformity if the mites are heavily infected or harbor an especially virulent strain of virus. A positive relationship was found between increasing numbers of mites on individual bees and the incidence of morphological deformity and death. This probably reflected the large number of viral particles transmitted by the mites, which resulted in many multiply infested bees dying before emergence. These results demonstrate the importance of the role of viruses when considering the pathology of *V. jacobsoni* and that much of the pathology previously associated with the effects of mite feeding could be attributed directly to secondary pathogens vectored by *V. jacobsoni* (Bowen-Walker et al. 1999).

Honey bee queens are the main reproductive female in the colony and therefore the development of a new colony and the replenishment of old workers depend on an egg-laying queen. Queens seldom show symptomatic

"Under field conditions, Varroa jacobsoni were shown to be highly effective vectors of deformed wing virus (DWV) between bees."

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disease, although she is the longest-living member of colony. Francis et al. (2013) evaluated 86 queens for viruses that were collected from beekeepers in Denmark. All queens were tested separately by two real-time PCRs: one for the presence of deformed wing virus (DWV), and one that would detect sequences of acute bee-paralysis virus, Kashmir bee virus and Israeli acute paralysis virus (AKI complex). Worker bees accompanying the queen were also analyzed. The queens could be divided into three groups based on the level of infection in their head, thorax, ovary, intestines and spermatheca. Four queens exhibited egg-laying deficiency, but visually all queens appeared healthy. Viral infection was generally at a low level in terms of AKI copy numbers, 134/430 tissues (31%) showing the presence of viral infection ranging from 10^1 to 10^5 copies. For DWV, 361/340 tissues (84%) showed presence of viral infection (DWV copies ranging from 10^2 to 10^{12}), with 50 tissues showing viral titers > 10^7 copies. For both AKI and DWV, the thorax was the most frequently infected tissue and the ovaries were the least frequently infected. Relative to total mass, the spermatheca showed significantly higher DWV titers than the other tissues. The ovaries had the lowest titer of DWV. No significant differences were found among tissues for AKI. A subsample of 14 queens yielded positive results for the presence of negative-sense RNA strand, thus demonstrating active virus replication in all tissues. BC

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

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The Honey Bee Health Coalition

Recent Accomplishments And Where We Are Heading

Intro/Overview, by Julie Shapiro

Honey bees play an integral role in our way of life. It's hard to imagine a world without bees, given how these hardworking insects support the foods we need and provide so many benefits to modern agriculture.

Beekeepers understand this best – and supporting their work is at the core of why the Honey Bee Health Coalition formed more than three years ago. Since then, the Coalition has worked to find common ground among beekeepers, growers, conservationists, agribusiness, academia, and the public.

The Coalition has grown to more than 40 organizations since its inception, but its focus and mission has remained constant: Collaboratively implementing solutions that will help to achieve a healthy population of honey bees while also supporting healthy populations of native and managed pollinators in the context of productive agricultural systems and thriving ecosystems. The Coalition does this by working in priority areas including hive management, crop pest management, forage and nutrition, and outreach and education.

The Coalition made incredible progress since launching more than three years ago during the 2014 Pollinator Week – and its members are eager to build on this substantial foundation. The Coalition is committed to continuing to equip beekeepers and their allies with the best possible information and strategies as they work with their partners in the conservation, farming, agribusiness, and research communities to support honey bee health.

The following articles lay out not only the Coalition's recent accomplishments, but also a glimpse of where we are heading over the next several months and years. We still have a lot of work ahead, but the Coalition has shown time and again the power of focusing on collaborative solutions and areas of agreement to support honey bee health.

To learn about the Coalition, its mission, members, and initiatives, visit **honeybeehealthcoalition.org**.

Shapiro is the facilitator of the Honey Bee Health Coalition and a senior policy director at the Keystone Policy Center, a nationally recognized nonprofit working to find collaborative, actionable solutions to public policy challenges. Keystone operates under a statement of independence to serve all of its project participants.

***Varroa* Resources**, by Mark Dykes

Honey bees face a wide array of challenges. One of the most serious today is *Varroa* mites. These parasites, the equivalent of having a basketball-sized tick attached to a human, drain the life from honey bees and spread easily from one colony to the next. Left untreated, *Varroa* mites can extinguish entire colonies and disrupt honey bee populations across broad regions.

Given the scale of this problem across North America, the Honey Bee Health Coalition developed an expansive guide laying out best practices to detect, monitor, and control *Varroa* mite infestations. The Tools for *Varroa* Management Guide, is now in its sixth edition and has been downloaded by thousands of beekeepers across the U.S. and Canada – and as far away as New Zealand.

Following the guide's initial success, the Coalition developed a series of informative videos to demonstrate integrated pest management and the methods described in the guide. The videos also include techniques to measure *Varroa* mite infestations in their hives and select appropriate control methods.

Finally, the Coalition developed a one-hour presentation for bee clubs and associations that walks their members through the Tools for *Varroa* Management Guide and provides step-by-step instructions on *Varroa* monitoring and treatment techniques. The Coalition also developed a video version of the presentation, which bee clubs and associations can simply play for their members.

Beekeepers can download the guide, watch the demonstration videos, or learn more about the bee club presentation by visiting **honeybeehealthcoalition.org/varroa**. All resources are provided free of charge and we encourage sharing with other beekeepers.

We also know that *Varroa* mites are adapting to control methods and chemicals widely used now. It is only a matter of time before these destructive mites build resistance to treatments that are currently on the market and persist despite the best control efforts by beekeepers.

In light of the growing need for new treatment methods, the Coalition is working with a group of U.S. and Canadian government agencies, agribusinesses, NGOs, and beekeeping associations to help identify and lay the groundwork for the testing of new Varroacides. This group is focused on:

- Developing a shared testing methodology that will seamlessly flow into the U.S. and Canadian registration processes;
- Funneling compounds that show promise into government labs in the U.S. and Canada to complete efficacy screening, moving compounds that show promise into field testing, and advancing these compounds to the registration and product development processes; and,
- Supporting the funding of lab and field testing.

Varroa mites pose significant challenges to honey bees, and the Coalition is dedicated to helping beekeepers at all levels work to monitor and control infestations.

Dykes is a Coalition member and Chief Apiary Inspector for the Texas Apiary Inspection Service. He serves as President of the Apiary Inspectors of America.

Crop Pest Management, by Robert Sears

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agriculture for decades. From canola to almonds, bees support a significant part of North American food production, billions of dollars in economic activity, and our ability to feed the world. Some facets of global crop production, however, have created challenges for pollinators, such as the expanded use pesticides and the elimination of forage due to expanded croplands.

The Coalition, cognizant of these challenges, is working with farmers, agribusiness, and its members to develop strategies to ensure field-level practices and products are utilized in ways that do not pose undue risk for honey bees.

To this end, the Coalition is promoting trainings to help crop pesticide advisers reduce honey bees' incidental exposures to pesticides. The Coalition also is working with the United Soybean Board to identify and implement best management practices to support honey bee health in the context of productive soy bean operations. The Coalition also has developed an incident-reporting guide to help beekeepers report pesticide-related bee-kill incidents.

Given the critical role states play in supporting honey bee and pollinator health, the Coalition has supported cross-dialogue on the development and implementation of Managed Pollinator Protection Plans (MP3s). These plans are intended to support increased communication between key stakeholders and help mitigate other risk factors bees can encounter.

Protecting crops and honey bees from the related risks of pests and chemical exposures will rest in large part on the beekeeping community's ability to articulate and execute a more effective collaborative strategy aimed at achieving a better outcome: a healthy system of agriculture that sustains crop production and managed pollinators, and protects our way of life. There are a number of paths to that outcome, including stronger regulation, election of legislators with positive environmental values, abundant and effective public education about pollinator issues, litigation, and more effective partnerships between advocates, regulators, those being regulated, and others. Cooperation and coordination among agricultural, pollinator, and conservation organizations, and reaching out to other sectors that support a pollinator agenda, will enhance the likelihood of achieving a better outcome by any of these paths. While that may mean changes in approach or tactics to accommodate a growing set of partners, it will also produce better results.

Sears is president of the Eastern Missouri Beekeepers Association.

Forage and Nutrition, by Jerry Hayes

Honey bees support one in three bites of the food we eat every day. Loss of habitat and forage due to land use changes, including cropland expansion and the growth of suburban lawns, have reduced bees' access to critical sources of pollen and nectar that they need to thrive.

The Honey Bee Health Coalition, cognizant of this changing landscape for honey bee nutrition and forage, partnered with U.S. and Canadian beekeepers this year to survey how they are confronting this challenge. The Coalition met with individual beekeepers this past winter and spring to discuss the nutrition challenges their hives face and the use of nutrition supplements.

The Coalition issued a report summarizing these interviews and recommendations in June. The report, available at **honeybeehealthcoalition.org/NutritionReport**, highlights the challenges bees face on the forage and nutrition front; explores why, when, and how beekeepers use nutrition supplements; and charts a path forward to enhance the research and resources available to beekeepers.

The report describes in detail how beekeepers provide their bees with food sources to supplement natural food sources and forage. These supplements, whether commercially produced or formulated by beekeepers themselves, help bees produce additional brood and obtain nourishment when natural pollen is lacking.

The Coalition's report also highlights a series of areas where more research and information is needed – both to improve commercially available supplements and to support beekeepers' individual decisions around how and when to provide supplemental nutrition to their colonies. For example, beekeepers told the Coalition they need more information:

- Understanding the components of natural pollen to aid the development of supplements that act as a "complete" diet for bees.
- Identifying critical elements of specific supplemental diets that address geographic, seasonal, and life-cycle objectives, such as queen rearing, and helping beekeepers confront critical challenges.
- Determining nutritional factors for strengthening the bee immune system and preventing disease.
- Comparing the nutritional and economic costs and benefits of proactive and reactive feeding strategies.
- Conducting comparative field studies of the efficacy of different commercial supplement products and feeding strategies.

The research priorities identified by beekeepers have not been compared against existing research – there may be a gap between the bee nutrition research being conducted and the information reaching beekeepers. The Coalition is working to act on the report's findings by exploring strategies to help incentivize and catalyze research and informational resources. To this end, the Coalition is planning to announce a related prize competition later this year.

In addition to the nutrition supplement report, the Coalition is engaging with policymakers and elected leaders to highlight how federal initiatives, including the Conservation Reserve Program, can support pollinator habitat and critical sources of pollen for hives. The Coalition has made recommendations on how to improve the cost-effectiveness and pollinator value of U.S. Department of Agriculture private land conservation programs. These recommendations include:

- Limiting the percentage of grasses in seed mixes;

- Increasing the minimum numbers of pollinator-friendly species in a seed mix;
- Allowing a broader range of native and introduced species adapted to a geographic area;
- Increasing the allowed seeding rate for pollinator plantings; and,
- Encouraging states to allow a broader range of establishment and mid-contract management options, to increase flexibility for landowners and farmers and ensure that pollinator plantings are successful.

It's important to underscore that these Coalition efforts and initiatives complement the numerous initiatives members already have underway. These efforts, highlighted in the Coalition's "Focus on Forage" informational resources (**honeybeehealthcoalition.org/focus-on-forage**), are already making significant inroad to supporting and sustaining nutrition sources for bees.

The Coalition still has a ways to go to ensure every honey bee has access to the forage and nutrition resources they need to thrive – including communicating with homeowners about incorporating forage into the roughly 40 million acres nationwide of suburban lawns. These efforts, however, are laying the framework to support and enhance what Coalition members and beekeepers at large already have achieved.

Hayes serves as Honey Bee Health Lead at Monsanto.

Bee Integrated Demonstration Project, by Pete Berthelsen

The Honey Bee Health Coalition is dedicated to developing the tools and resources beekeepers and others need to confront the root causes of colony losses. This multi-factor approach is essential, because we know there is no single driver of colony losses. That approach drives the Coalition's work and broad focus.

The Coalition's 'Bee Integrated' Demonstration Project is a one-of-a-kind effort that will leverage and integrate existing, effective programs and best practices into one common project and agricultural landscape to improve bee health.

Bee Integrated, launched in April 2017, brings together beekeepers, farmers, and diverse group of private and public sector partners in the upper Midwest to demonstrate how a portfolio of best practices can be used together to address bee health risk factors including pests, poor forage, and pesticide exposure. The project provides a bridge between research and implementation by demonstrating and validating best management practices and widely promoting solutions for sustainable beekeeping.

In its pilot year, the project will work with a handful of beekeeper-farmer pairs in North Dakota to demonstrate how honey bee health can be improved through planting pollinator forage in partnership with the Bee and Butterfly Habit Fund, monitoring and treating for varroa mites following the Coalition's Tools for Varroa Management Guide and in partnership with the Bee Informed Partnership, and following the guidance of the North Dakota Pollinator Plan.

Funding and in-kind support for the project is provided by The Bee and Butterfly Habitat Fund, Bayer CropScience's Healthy Hives 2020 program (administered by Project Apis m.), the National Honey Board (also administered by Project Apis m.), DuPont Pioneer, the ND Outdoor Heritage Fund, and the North Central IPM Center. Monitoring is being provided by the Bee Informed Partnership and U.S. Geological Survey.

We have a unique moment in time to show and demonstrate in the real world what it takes to best support bees and other pollinators. This exciting project represents the Coalition's multifactor approach to honey bee health in action. The results of this three-year endeavor and the lessons learned will provide blueprints of how beekeepers and grows can support each other.

Berthelsen is an avid sportsman and pollinator advocate. He most recently served as a founding member of The Bee & Butterfly Habitat Fund.

The Bee Understanding Project, by Richard Waycott

Collaboration and cooperation serve as the foundation of the Honey Bee Health Coalition's work. The Bee Understanding Project is a great example of the Coalition's core principles in action.

The Project, through its groundbreaking job swaps and outreach, has given beekeepers, growers, crop advisers, and entomologists the opportunity to share perspectives in an effort to help enhance honey bee health. These experiences helped beekeepers and growers see how their decisions affect each other and honey bees' wellbeing and gave them first-hand experience of what each other face day-to-day on the farm and in the beeyard.

The Bee Understanding Project produced an award-winning documentary that highlighted the value of its job swaps and the dialogues they sparked. The Coalition has shown the documentary at trade shows and other events to build a better understanding in the agricultural community and other key sectors of the importance of honey bee health for our food supply.

You can watch the film at **honeybeehealthcoalition.org/the-bee-understanding-project**.

Given this success, the Bee Understanding Project is working on a new round of job swaps focused on the central role honey bees play in almond production. In cooperation with my organization, the Almond Board of CA, the Bee Understanding Project will host a new job swap that includes almond growers, beekeepers, crop advisers, and other key stakeholders.

This swap also will result in a short documentary that can be shared more broadly with the beekeepers, farmers, and the public. The film and job swap will be a center piece of outreach to the public around what they can do to support honey bee health.

To learn how to participate or support the effort, contact Richard Crespin, who is managing this effort, at **richard@collaborateup.com**.

The job swaps and filming will take place starting in Fall 2017 and wrap up during the 2018 almond bloom. BC

Waycott is the president and CEO of the CA Almond Board.

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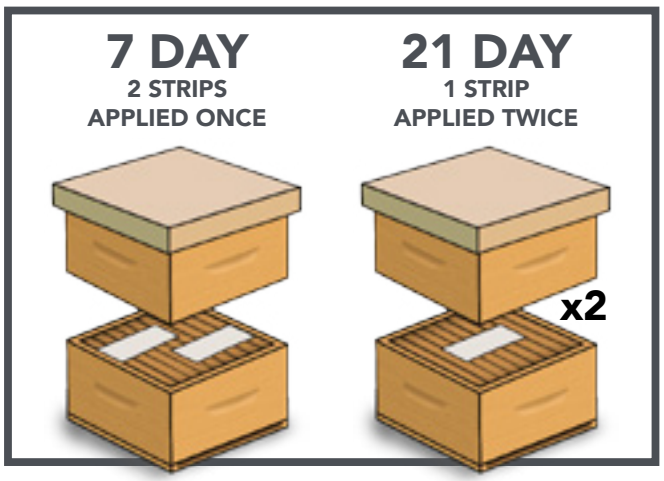

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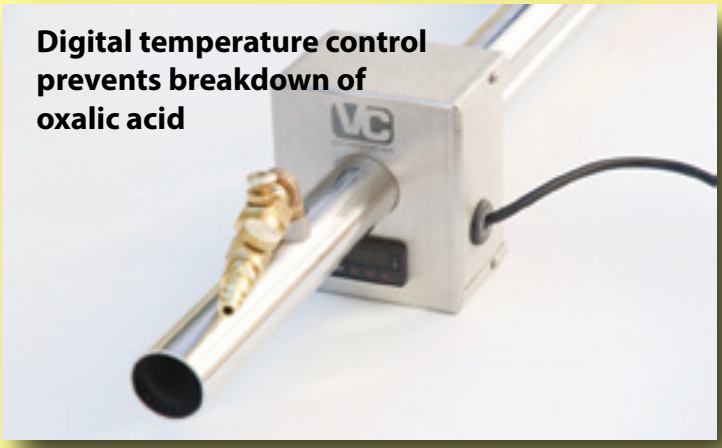

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NOD Apiary Products' Story Of Innovation

THE CHALLENGE

Part 1, Developing An Environmentally Friendly Miticide

David **VanderDussen** and Kathleen **Ireland**

This article is the first of three about the process of developing and bringing to market an organic pesticide to control parasitic mites of the honey bee. Part 2 is about the field-testing process. Part 3 takes a look at the registration process, the necessary hurdle of meeting government requirements to be able to make the product available to the beekeepers.

Key elements of a miticide

A typical pesticide has two elements: the Active ingredient (A.I.), which is what causes the mortality of the pest, and the carrier of the active, called the inert ingredients or the excipients of the formulation. Both elements are very important to the effectiveness of the end product.

Chemistry is key.

Because biochemistry is the foundation of NOD's miticides, we will start in the lab. Initially the lab was the classic kitchen table; NOD outsourced to contract laboratories for analysis expertise when needed. Now NOD has a well-equipped lab in-house, staffed with a chemical engineer, a quality control officer and a lab technician.

The lab is critical throughout the process: it is where formulations are developed, where we use analytical methods for all the ingredients, analyse intermediate products that are produced during various stages of manufacturing, and develop method of analysis for the end product. It also utilizes proven and commonly recognized methods to conduct residue analysis, assess total acid levels in honey, and to determine product shelf life.

Environmentally friendly by choice

When NOD was founded in 1997 we decided to focus on formic acid as our active ingredient of choice. Initially its appeal was that formic acid is very common in the environment, is a natural component of many foods, including honey, and beverages, such as coffee. In nature, some ants use it as defence chemical, giving the acid its common name, from the Latin *formica*.[1] The actual chemical name is carboxylic acid. Some plants also use formic acid as a defence chemical: the stinging sensation from a brush with a nettle plant is due in part to formic acid.[2]

Formic acid is an organic acid, classified by the EPA as a biopesticide. *Varroa* mites are the main target here in North America however, as it turns out, the three parasitic mites of economic significance to the honey bee are all susceptible to formic acid. (see side bar "Identifying the Enemy: The Mite Triad")[3].

For the excipients, NOD decided to work with compostable saccharides. In biochemistry, the suffix "*-ose*" is used to indicate that a compound is a sugar. For examples, table sugar is sucrose, high-fructose corn syrup is a sugar commonly mixed in feed, and, looking at plant structure, wood is cellulose. As strange as it may seem, wooden beehives are actually made of a sugar!

Saccharides are a very complex part of organic chemistry. In our case, the low pH (~2) of formic acid causes desirable chemical reactions with some saccharides, such as turning some powder saccharides into a gel, however the presence of other specific saccharides can block the desired reaction, making formulation tricky. With some saccharides there is little to no chemical reaction to formic acid, but they have other properties, which can be used to bring stability and vapor release.

Formic Acid Vapor Release Challenge overcome

One of the challenges of using formic acid is its high volatility. Part of our work with saccharides was

About Us

NOD Apiary Products Ltd. is a Canadian company formed in 1997 by beekeepers. Honey bee and animal health is our focus. The founders at NOD saw formic acid as the active ingredient most likely to be developed into a practical, sustainable miticide for the beekeeping industry. Properly formulated, it could control varroa and tracheal mites, protect the image of honey as a wholesome food, and leave no residues in the hive components.

NOD Apiary Products Ltd. continues to aid the developing apiculture industry by producing organic and sustainable Honey bee health products.

Our global reach at NOD Apiary Products Ltd. continues with operating subsidiaries in the United States, NOD Apiary Products USA Inc. and NOD Europe Ltd. in the United Kingdom.

NOD Apiary Products was awarded the Ontario Premier's Award for Agri-Food Innovation Excellence, 2006, Innovation Project of the Year, 2008 and Agri Business of the Year, 2011. Our passion is honey bee health and young livestock wellness, and as such, we are dedicated to environmental stewardship.

[1] https://en.wikipedia.org/wiki/Formic_acid
[2] http://www.botanic.cam.ac.uk/Botanic/TrailPlace.aspx?p=27&ix=261&pid=0&prcid=0&ppid=0
[3] de Guzman, L.I. *et al.*, (2017), *Ecology, Life History, and Management of Tropilaelaps Mites*, Journal of Economic Entomology, 110(2), 2017, 319-332.

Identifying the Enemy: The Mite Triad

The honey bee is the host for three parasitic mites of economic significance. At the top of the list is the varroa mite. Once isolated to South East Asia with its natural host, *Apis cerana*, *Varroa* mites have spread around the world over the last 50 years by infesting colonies of western or European honey bees, *Apis melifera*. *Apis mellifera* itself was spread around the world during European colonization, as settlers to new environments brought their farming practices with them. The European honey bee has few natural defences against *Varroa* mites; despite many years of breeding programs most beekeepers find that constant vigilance and timely intervention is required to keep their colonies from succumbing to this pest.

The second parasitic mite that western beekeepers are familiar with is the tracheal mite, *Acarapis woodi*. Its source history is not well known, but its discovery and identification in the British Isles in 1919 is associated with the infamous Isle of Wight disease outbreak earlier in the century. It is an ectoparasite of the adult honey bee. Most of their lives are lived in the trachea of the bees, only emerging from the trachea to transfer to a new host. A microscope is required to determine their presence.

The third mite of the honey bee, Tropilaelaps, is found in Asia. Unlike varroa, it has not spread far outside of its natural range, likely due to the fact it is not able to feed on adult bees, so is reliant on bee brood being present. It is a very quick mite, but, although smaller than the varroa mite, it too is visible to the naked eye. Where both mites co-exist, Tropilaelaps is often considered to be the more serious pest.

Importance of Control

Any one of this triad of parasitic mites can bring down a honey bee colony over time, however, when found in combination the outcome is accelerated. The tools available to beekeepers are limited; especially when one considers that what is being attempted is to cause mortality to bug on a bug!

harnessing ester-based reversible reactions that can be utilized to release the formic acid vapors over time. Another aspect is overcoming surface coagulation. The ecopaper material, pressed into the gel during the manufacture of NOD's formic acid strips, acts as a wick, to allow the release to continue over several days, quite an accomplishment when you consider the thinness of the strip so it will fit in the bee space, and the volatility of formic acid at the temperature of the brood nest.

The development of a pesticide takes many years, from concept to formulation to field testing, and many times back to the drawing board. Once field-testing is successful, the next step is to ensure that a reasonable shelf life is possible. With Mite Away Quick Strips (MAQS), NOD had developed a product that would be usable for a minimum of 12 months as long as it was stored under 25°C. The decision was made in the Fall of 2009 to bring it to market. Registrations were applied for and granted, starting in 2010 in Hawaii due to State support of its organic honey industry. Mite Away Quick Strips is now registered and sold in 22 countries around the world.

Customer feedback is important to us to ensure we are meeting peoples' needs. The biggest challenge to emerge was the shelf life and the cool storage conditions required to keep the strips from going too soft. The R&D project manager turned to a new goal.

Advances in Shelf Life and Storage Conditions

Back in the lab many saccharides were screened as potential shelf-life extenders for the Mite Away Quick Strips technology. In the end it was decided to go with two: one to act as a stiffener and the other as a binder. After five years of development and testing we are extremely proud to introduce the next generation organically based miticide, *Formic Pro*™. The US-EPA has granted us a two year shelf life to start with, which can be extended as more data becomes available.

Upcoming: Part 2: Into the beeyards for field testing.

I hope you have enjoyed the peak into the lab stage of the development of a biopesticide. In Part 2 we will look at dose determination, harnessing the bees' natural activities, targeting mite castes, and the risks to host species, our honey bees. BC

FOUND IN TRANSLATION

Pollen Counts: New Ways To Assess Forage Quality

Jay **Evans**, USDA Beltsville Bee Lab

A clear understanding of the range and diversity of pollen collected by honey bees is important for improving colony health. Pollen from different species differs in protein content and other nutritional traits, and in some cases a multifloral blend of pollen might give bees a stronger start than ample levels of any single species. Scrutinizing bee-collected pollen also provides an efficient way to survey available flowering plants for science and policy decisions. In fact, were it not for the bees, such surveys would require many researcher-lifetimes spent watching flowers or foraging for and counting pollen sources – and it would still require some guesswork to determine the realized value of these pollen sources for bee foragers.

Palynology, the visual study of pollens in order to assign species, is a longstanding field in bee research and plant biology generally. Trained palynologists can discriminate between hundreds of pollen types, and this method has had a big impact on assigning current and past plant distributions. As one example, the Discover Life consortium and Professor Debbie Delaney at University of Delaware have published a helpful visual guide for identifying some North American pollens (**www.discoverlife.org/mp/20q?guide=Pollen**). Gene-based strategies provide a complimentary and extremely effective approach for identifying the plant sources of pollen collected in the environment. Variable DNA regions or 'barcodes' can precisely link pollen grains to the plants that produced them. What has card-carrying palynologists worried for their livelihoods is the fact that even hugely complex pollen mixtures can be screened relatively cheaply, without presorting grains. These genetic techniques are now showing their worth in practical studies of forage availability for honey bees and other pollinators.

On the technical side, a gene-based survey of pollen faces two major challenges, the equal extraction of DNA from pollens of all species and the presence of a suitable genetic region that is definitive for all species in a given environment. For the latter, there are strong cases currently for several genetic regions that can be used as barcodes to identify pollen sources. I know my limits and won't try to rank these, but reputable bee researchers have shown the worth of using the Ribulose bisphosphate carboxylase large chain gene (rbcL; Karen Bell and colleagues, **doi:10.3732/apps.1600110**) and the ribosomal RNA internal transcribed spacer (ITS) region (Robert Cornman and colleagues, **doi:10.1371/journal.pone.0145365**). Rodney Richardson and colleagues have contrasted these regions and a third region with microscopic counts in an attempt to show their strengths and weaknesses (**doi: 10.3732/apps.1500043**). Similarly, Smart and colleagues (**doi: 10.1093/ee/nvw159**) pitted informative genetic markers against microscopic analyses by knowledgeable palynologists. These studies show some clear challenges involving DNA extraction and 'equal representation' faced when using gene-based techniques versus microscopy. Nevertheless, both studies highlight the vast and quantitative insights gained from a well-planned genetic screen.

So, which questions are being addressed using a genetic approach to count pollen? One timely question involves honey bee foraging in the highly productive 'Prairie pothole' region of eastern North and South Dakota. This area is a home base for many of the leading commercial beekeepers, in large part thanks to an abundance of natural forage. 'Wildflowers' in this region have led to productive honey flows for decades and remain a key resource for the industry. Work led by federal agencies, including the U.S. Geological Survey (USGS, **www.npwrc.usgs.gov/pollinator/home**) and US Department of Agriculture (USDA), along with the University of Minnesota, has focused on maintaining and improving this resource. Some of this work involves the mapping of changing land-use patterns on a regional scale (e.g., Clint Otto and colleagues, **doi: 10.1073/pnas.1603481113**). Land-use decisions involve a complex analysis of many factors, including agricultural practices, weather patterns, and the presence of managed and wild bees. Important insights for these decisions are coming equally from field observations as well as computer-based and genetic studies. Gene-based counts of pollen collected by bees, including the recent work in the Dakotas by Smart and colleagues, are playing an increasing role in making sound beekeeping and land management decisions. Beekeepers in the future might use pollen ID's along with colony survival and honey yields as a measure for determining when and where to place their hives. There is some poetry there in that this is yet another case of harnessing the immense honey bee workforce to give humans a helping hand. BC

$20 HONEY

30 Tips On Selling Honey. You Don't Have To Be Clever, Just Honest

Leo **Sharashkin**

"Do you have local honey?" inquired a store customer. – "We surely do, ma'am!" The associate took the lady to the nook with a large dispenser atop a heating pad. "It is $7.15 per pound and you can fill your own container or ours. This honey has local pollen; many of our clients buy it to help with allergies this time of year." – "Thank you!"

I thought this typical little scene at a health food store was over, but what happened next grabbed my attention. The salesperson left; the woman took an empty jar to pour some honey in. But then she hesitated, returned the jar to the shelf, and walked over to a display of prepackaged honeys. There was organic honey from Brazil and Canada; standard Grade A clover honey in big jugs; buckwheat, orange blossom, tupelo and other specialty honeys from around the U.S.; comb honey from a local beekeeper; and a variety of others. The woman carefully read several labels and, finally satisfied, put a small jar into her basket and proceeded with shopping.

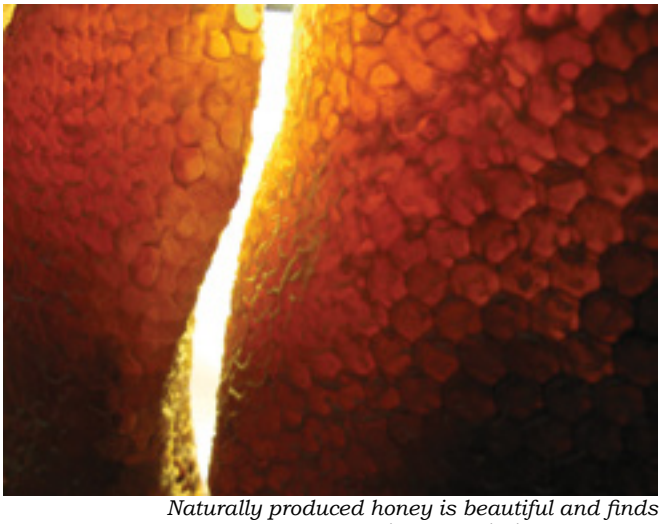
I looked to see what honey she ended up buying. It was a nine-oz jar of manuka honey from New Zealand for $19.95! Hesitant to buy local honey for $7.15/lb, she paid *five times* as much for honey from overseas. Why?

I was so intrigued I got a jar for myself, too. Arriving home, we had a tasting. The manuka honey was surely not bad, fragrant and with a distinct flavor, slightly sour and bitter at the same time – but, its purported health benefits notwithstanding, the taste was not superior to the honeys that the Ozark wilderness has to offer. Our citrusy sumac honey or the rich wildflower honey from a hundred different species certainly have their own range of healthful properties, but until a scientist isolates a miracle molecule unique to them, local treatment-free beekeepers sell their honey $10/lb.

I kept going back to that experience when the time came to set price on my own honey. I had started beekeeping to provide uncontaminated honey for my four children, and initially thought I would never have a surplus to sell – using honey as the only sweetener, our household can go through a gallon of honey in a *week*! But the apiary kept growing; the wild survivor-stock bees (attracted swarms) never ceased to amaze us with their robustness and survival rates in excess of 85%. Eventually, several years ago, I had the first 200 lb to sell. How much should I ask for it?

$20/lb honey flying out the door

Confident that my honey is on par with the most expensive exotic varieties, I set the price at $20/lb. I reasoned: if nobody wants it for this price, we'll eat it ourselves! This concern proved ungrounded: I sold out the small crop within six weeks. And when I had the last one-pound jar left, someone from Alabama ordered 100 lb through my website, paying $2,000 without even asking for a discount. I picked up the phone and called the customer. "Ah yes, said a pleasant voice in the receiver, we are a small food coop; one of our members tried your honey and was raving about it so everybody decided they wanted a jar." When I explained I only had one jar left and wouldn't have more until this time next year – do you know what she said? "Can you keep the payment so we are first in line for the next year's crop?" This sounded completely surreal, but I refused: I did not want to be under pressure to produce even a hundred pounds. I never feed my bees sugar; in case of a particularly bad year, I would rather leave all honey to the bees than pull the reserves they need for wintering.



Naturally produced honey is beautiful and finds its appreciative customers.

"You are an elitist, Leo," remarked a beekeeper friend when I told her of my success. "You're a good marketer so you sell honey to people who can afford $20 a jar. Why not produce a pure product that is actually affordable?" She was right, but in all honesty I did not see a way to offer my honey for less, given the high standards of natural beekeeping I follow: no treatments, no sugar feeding, working with local bees, propagating by natural swarming only, stationary well-insulated hives, etc.

For a while I felt guilty of being a greedy elitist, until my sins were forgiven by a customer of mine who stopped by to get three pounds of honey. She lived on social security and had to save even for the most basic of purchases; $60 was a lot of money for her. I felt

uncomfortable accepting the money and apologized for my honey being so expensive. "Oh no! Your honey is not expensive for what it is! I'd rather have a *teaspoon* of your honey than a whole jug of what they sell at the store. Yours is a better deal."

"More" is "better"?

True, so much of American beekeeping has been about producing honey as a commodity: large volume, low prices. "You need a thousand hives to make a living," a seasoned Missouri beekeeper told me. But high volume requires high inputs (truck, forklifts, drugs, feeds, hive equipment, hired labor, and bees), and the low profit margins make you vulnerable, because Chinese farmers can still do it for less.

There is a different path: producing a product of the highest possible *quality*, working with local bees and local plants. I can clearly see that this artisan product – really the "flavor of the place" – is in high demand and finds a market. It does take some marketing skill to make the first sale, but after gingerly trying a jar of my honey many people come back for 10, 20, 30 pounds each year and, as my newest client put it, become "customers for life."

No matter how wonderful your honey is, to distinguish it from what is available elsewhere, people need your help. Yes, they may literally "taste the difference," but the story of how it was produced will stay hidden unless *you* share it with them. So I developed some thirty "selling points" that I communicate in person, on labels, through my website and flyers that I include with every jar I mail out. To be sure, I do not view it as marketing. It's almost a missionary journey of helping fellow human beings discover one of the essential pleasures of being alive on this beautiful planet – the taste of honey.

Pictures of our children and honey make great website banners. Beautiful imagery and a clear message – and honey jars just fly out the door! My son Yarosvet with a four-pound comb from a Layens hive.

1. The taste of honey

Flavor, of course, is a highly subjective thing – yet another reason to put my personal opinions aside and go by the reaction of my customers. Here are a few actual quotes – a much higher reward than money:

"Seriously it is the best honey I have ever had. A little piece of Heavenly Glory!" – Tom, Chicago

"Delicious!! Any other honey will taste flat after this one. I forgot what real honey tastes like! Awesome product, will have stocked up for the Winter." – Louise, Connecticut "The honeycomb is absolutely amazing. It will be difficult to eat it in moderation. Thank you for what you are doing for the bees." – Tiffany, California

Hearing such praise is humbling; I certainly take little credit for it. I simply let the bees and the flowers work their magic, trying to interfere as little as possible. The effervescent outpouring of joy that many people experience tasting my honey shows me that I am on the right track with my approach, and that the simple old-time techniques I employ bring great results. I would like to share some of them with you.

2. Made in the USA

The majority of people do not realize that most of the honey consumed in this country is imported. Nor can you assume that honey from a local *beekeeper* is necessarily local: many keepers move their hives around the country. A health food store owner in Missouri conveyed to me how deceived she felt after discovering that the honey sourced from a local beekeeper turned out to be his crop from three different states down south.

To highlight the truly local character of my crop, I like making reference to local natural landmarks: "Our honey comes from a serene location in the heart of the Ozark Mountains, whereas most of the honey consumed in the U.S. is imported, including from China. Chinese honey is banned in Europe due to lead and dangerous chemicals it may contain, but continues to find its way to U.S. grocery store shelves, often labeled as coming from another country."

3. Remote woodland location

"We do not have commercial agriculture or industrial plants anywhere close by. It's so remote we don't even have cell phone reception! The nearest corn field is some 30 miles away. The nectar and pollen bees gather come from wild-growing flowers and trees which have not been sprayed with pesticides or any other chemicals. The benefit of this seclusion is absolutely pure honey without any traces of pesticides or other chemicals. "

4. Rich biodiversity

Biodiversity means "diversity of *life*." Where there is no diversity, life itself is in danger. This is why monoculture farming – prevalent in America today – is so utterly unsustainable, plagued with terrible pest problems and crops and animals prone to disease. Lack of biodiversity hits beekeeping hard – whether we speak about the genetic diversity of honeybees or the flowers they forage.

"Where we live, we literally have *hundreds* of different species of wildflowers that contribute to the richness of our honey and the health and well-being of our bees. By comparison, much of the commercially produced honey comes from bees pollinating the vast fields of monoculture crops, which can rarely boast the complex flavor characteristic of many honeys produced from wilderness plants."

The blossoms of buttonbush fill the air with a tropical, Hawaii-like fragrance. This pretty plant is native to the Midwest and attracts scores of bees with its highly aromatic nectar.

Much of my honey crop comes from sumac – a fast-growing native shrub that thrives even on the poor rocky soil of the Ozarks. It easily spreads by the roots and keeps pumping nectar in dry, hot weather.

5. **"Beaujolais nouveau" of a honey**

Apart from sustainability, bee health, and flavor, producing honey from the vast diversity of wilderness plants has another benefit: each batch turns out unique, distinct, and unpredictable. Weather patterns during a given season interplay with the idiosyncratic blooming of different plants to produce flavors that rarely repeat themselves. Like wine connoisseurs eagerly anticipating the release of the new harvest's wine, my customers wait to discover just how the honey will turn out this season. This anticipation is rewarded. Here is reaction of one of my best clients to the taste of the new crop: "The flavor is unbelievable! We're consuming it with lightning speed and need six more jars. This one is unique, but all your honeys are. You spoil us!" – Lena, New York.

A severe Summer drought one year produced honey with strong bitter overtones of oak and black walnut leaves, apparently from honeydew (very rare in these parts). Another year an early September frost killed aster blooms and the army of foragers probably switched over to the juices of ripe wild grapes that were in great abundance. The Fall crop that year tasted like grape jelly! I could dwell forever on that – but let us move on with our list.

With a staionary apiary you get a true "taste of the place," and it changes from year to year. All these stunningly different honeys come from the same beeyard!

6. **We don't move hives around**

"Our hives stay in the same place. Big commercial beekeeping, on the other hand, is largely migratory – hives are loaded by the thousands on trailers and trucked around the country. Moving the bees is *completely* unnatural, spreads disease, and causes the colonies big stress. Imagine walking out to the porch one morning and discovering your house moved overnight from California to North Dakota!"

7. **Sugar-free!**

"Like *Orbit*, our honey is sugar-free! We *never* feed our bees sugar. The result: healthier bees that live exclusively on the natural diet of nectar and pollen, and no traces of sugar in the honey itself.

8. **No chemicals, ever!**

"We do not use *any* chemicals or any other 'treatments' on our bees, hives, or honeycomb. As a result, our honey is 100% pure and uncontaminated. By comparison, most commercial beekeepers routinely use chemicals and antibiotics in their hives to prevent bee diseases.

9. **Dark-comb honey**

One of the many benefits of being completely treatment-free is that I can safely extract and consume the dark brood frames. This is the flavor I grew up with. My uncle would sell the snow-white comb on the market, but the black honeycomb full of beebread (and cocoons and larval poop too!) was ours the kids to devour. To the extracted honey, dark comb lends a deep amber color and a very particular taste reminiscent of aged whisky. A huge hit with my clients, and definitely a topic for a whole separate article.

Dark-comb honey aged for three years inside the brood chamber will rival the best of chocolates with its deep and complex flavor.

10. **High pollen count**

Extracting brood frames with beebread boosts pollen count in your honey. Pollen is commonly filtered out to conceal the place of origin (as is the case of Chinese honey) or to prevent crystallization. But I am finding that high-pollen-count honey is hugely attractive to anyone who does not view honey merely as a sweetener to squeeze out of a plastic bear.

The preceding points largely have to do with the qualities of honey: flavor, purity, local character, uniqueness, and goodness – but this is just the beginning. Let us look at some of the actual practices of bee husbandry. You may not "taste" them all in the honey, but, as the Little Prince put it, "what is essential is invisible to the eye." The following represents *how* and

Combs full of beebread (fermented pollen) are always the first to sell out (as cut comb), and inspire the most exuberant customer reviews. If extracted, they boost honey's pollen count – the quality sought after by a growing number of consumers.

why I do beekeeping. Are you a "beekeeper" or a "honey producer"? To me, there's a big difference.

11. Local bees

We only keep bees of the local strains. They are better adapted to the local weather, climate conditions, blooming patterns of plants, diseases and parasites than non-local bees artificially bred at large breeding facilities in the South. Every Spring I set out swarm traps in the wild, away from any known apiary – and one box out of two will have a swarm move in. This is the only stock I have ever used, and I couldn't dream of anything better. By not bringing in any non-local bees, we help to preserve and enhance the local wild honey bee population with its wonderful genetics. I would rather not keep bees at all than contribute to the demise of local honey bees by diluting their bloodline with that of the non-adapted imported stock.

12. Bees come first

"We leave plentiful honey and pollen reserves for the bees in the hive at all times. Good nutrition means healthy and productive bees. We only harvest the real surplus that the bees won't be able to consume themselves and which, in nature, would be lost to bears, moths, and other honey lovers. So our honey is produced without 'robbing' the bees – this is the true surplus that can be extracted without any danger of compromising the bees' own food stockpiles."

To do this harvest honey in the spring. This way there's no guesswork as to how much honey the bees will need that particular winter *and* the spring honey comes after spending an additional six months inside the hive, which intensifies the flavor (the difference is especially noticeable for dark-comb honey).

13. Minimal disturbance

One day I received an email from a fellow beekeeper: "This hive is driving me crazy. I've inspected it 19 times in the past three months, and I still cannot find the queen!" I almost felt as though the next email would be coming from the *bees*: "This beekeeper is driving us crazy. He inspected us 19 times for no other reason than finding the queen!"

We do not do anything like that. Typically, I only open a hive two or three times per year (as was the norm in the days of old): checking it for brood and adding frames in the spring, then pulling honey in the fall. The structure of the horizontal hive allows me to pull honey from one end of the long box with zero disturbance to the brood chamber, which is at the other end. Because I have access to all frames at once, any manipulation can be done quickly without destroying the integrity of the bee nest.

Resilient local bees plus the horizontal hives I use, including this Layens, allow me to manage my yards with two or three visits per year. Laid-back beekeeping at its best.

14. Propagation by natural swarming only

We do not meddle in the love affairs of our bees! They propagate naturally by swarming. This approach is cruelty-free, and produces stronger bees: they eat their own honey and pollen, and the queen has the chance to mate with the best-performing local drones. By comparison, most of the commercial bee colonies are bred artificially, fed sugar syrup, and then shipped to beekeepers in packages together with a queen that was likewise artificially raised and often artificially inseminated.

A swarm walks into one of the hives beautifully decorated by my wife, Irina. Swarming is very important for bee health, so I stick to it as the only method of increasing the apiary. I've never made a single split.

15. No requeening

By the same token, we do not requeen our hives. Today, the practice of finding the queen, killing her, and giving the hive a new, young one is almost universal. We never do that! If the queen grows old or deficient, the bees will arrange a replacement themselves.

By not requeening, we prevent the artificial bias of passing on to the next generation certain traits at the expense of others. I have some hives that have not given me *any* honey *ever*. Yet at the same time these are the hives that have successfully survived, treatment-free, for five years or longer. I let them be, and I know that in the big scheme of things these "non-productive" colonies are extremely valuable to the health of the overall population. They obviously possess certain survival traits that their drones spread to other colonies.

16. "Not tested on bees"

We do not kill bees' brood with liquid nitrogen. We do not drown bees in alcohol. We do not do any of the other things that have become an accepted beekeeping practice in the name of "fighting the disease."

I'm seeing "Certified Humane" labels on a growing number of animal products. I am yet to see it on a jar or honey. People who adhere to a vegan diet do not consume any animal products, including honey, concerned with the cruel practices that are part of animal husbandry and beekeeping. I am very proud to have vegans among my customers: they can eat *my* honey, and this is a very high standard to meet.

17. No queen excluders

We do not use queen excluders and give the bees the freedom to arrange their nest as they would do in nature. The number of frames colonies use for brood is highly variable. With our horizontal hive setup the bees themselves decide how big the brood chamber should be. One piece of beekeeping equipment less for me, and one more step towards better control over the nest space for the bees.

18. "Chock full of pheromones"

As the queen walks about the comb, her footprint pheromone is being absorbed by the wax. Because I use brood-chamber dark comb for extraction and cut honey, I can claim it contains queen's pheromones. I do not think that their concentration could ever be high enough for anybody to be able to taste the difference, but I like the thought that my honey is the way nature intended and has the invisible majestic presence that becomes part of *you* as you ingest it. "There's nothing royal about 'royal shrimp,'" wisely observed my son Yarosvet. But hey, there is surely something royal about my honey, and I even have a name for it — the queen pheromone.

The queen was here. Some chunks of cut comb I sell will have empty queen cells. Chemical-free brood-chamber comb honey is only possible with natural, treatment-free beekeeping.

19. All-wood, well insulated hives

My bees live in better conditions than I do! My house is built of concrete, plywood, gypsum, MDF, vinyl, bitumen, polyisocyanurate foam and more. The bees' homes are made of 1½" solid pine; some are double-walled with natural wool for insulation. Well-insulated hives mimic the bees' natural nest – a tree hollow, and greatly reduce stress from both hot and cold weather.

20. Hives are beautiful

Many of my hives are beautifully decorated. One would say a picture gallery under the open sky. Bees living in beautiful hives make tastier honey. No, this is probably not true, *but* pretty hives surely produce a better impression on apiary visitors than dilapidated old hives with pealing white paint. And they do have an added benefit: the unique fanciful designs help the bees orient and return to their own hive, reducing drift and the spread of disease.

All right! Thankful for the keeper's non-intervention, bees have produced a crop of royal honey. Let's try and not destroy its goodness during the harvest and packaging!

21. Fully ripened in the hive

Because of the horizontal hive's large volume, bees have plenty of room for the entire season, so there is no need to check them or add more hive space in the middle of the summer when they are highly active. Instead, I can postpone the harvest until Fall (mid- to late October here in south-central Missouri, Zone 6). By that time all surplus frames are fully capped, there are fewer bees and they are preparing for wintering in the brood chamber. I can pull frames with minimal disturbance. The result is honey that has fully ripened in the hive.

This picture was taken on October 17 – a typical timing of my honey harvest in southern Missouri. After spending the entire Summer in the hive, the honey is fully ripe and almost all cells are capped. When doing a late harvest, move quickly and take all precautions against robbing.

22. Not dried or dehydrated

Even when fully capped, my honey rarely has moisture content under 19%. For a number of years I was concerned, because you read everywhere that "honey with over 18.6% moisture may ferment." However, this was not my experience. My honey commonly has water content between 19% and 19.5%, and never fermented. I could try to bring it down to the magical 18.6%, but I don't. When you dry honey, you also lose some of its volatile components that make up the aroma.

23. Handmade

We use no electricity in the extraction and bottling process. The hand-crank honey extractor is turned by children's hands (you don't really need a motor when kids are around!). There are no pumps, heaters, or uncapping machines. Yes it takes longer, but the harvest turns into a family celebration, instead of being filled with the sounds of working machinery.

24. No plastic jars or comb

The seminal jar of manuka honey I mentioned above was made of amber-color plastic. Initially, I was packing my crop in 1-lb plastic jars, too. Most of my honey goes out by mail, and plastic jars are easier to pack and cheaper to ship.

Everything changed after a customer requested 20 lb packed in glass jars. That doubled the shipping cost, but she was fine with that. "I hate plastic, she explained. And then, Leo, how can you pack your amazing honey in plastic? It cheapens it." Upon consideration I packed the rest of the crop in glass jars (and included it in the description), and it started selling even better. I never went back to plastic packaging after that.

Many beekeepers use plastic comb or plastic foundation. I don't – partly because I want to give bees the freedom to build their nest as they see fit (I give preference to foundationless frames), and partly because I see that being plastic-free contributes to the value of my product.

25. Raw, never heated

It's all in the placement of the comma. My honey is "raw, never heated," although "raw never, heated" may be more common today. Heating honey can be convenient during extraction and processing; it also slows crystallization. I've seen "raw local honey" on tap at a health food store; it was inside a dispenser with a heating element in it!

I use a tangential extractor, and I'm finding it spins honey out very well at room temperature. As for crystallization, I love it – because it's another indication that my honey has not been heat-processed.

26. Unfiltered

I only use a large-cell stainless steel colander to strain the honey. If it was not for the small hive beetles (one thing I don't want in my honey!) – I might even skip the straining step. The colander I use lets small bits of wax and pollen through, which will float to the top of the jar after bottling. My customers like that – it's like "cream-on-the-top yogurt."

Heating and forced filtering is largely about preventing crystallization, but I actually encourage that.

27. "Improves with age"

I write on my honey: "will beautifully crystallize with age." Crystallization used to be such a desirable quality in honey that de Layens even describes techniques that *promote* crystallization. There is absolutely nothing wrong with crystallized honey (even from the marketing standpoint); it all has to do with custom and customer education. What may be viewed as a flaw this moment may become an asset a second later.

28. Never frozen

I find cut comb honey in high demand. It is standard practice to freeze it to kill wax moth eggs that may be present. I refrain from doing that, because freezing and thawing changes the structure of water, and honey is 20% water. Instead, I advise my customers that the comb may have the *naturally occurring wax moth eggs in it and should be refrigerated. "That is great!" my best New York customer was enthusiastic. "When I go to a farmer's market, I always look for lettuce with insect-damaged leaves. If bugs can eat it, it's safe for me, too! And if an apple happens to have a worm inside, it's sure indication it was not sprayed. And chilled comb honey – what an exquisite dessert!"*

29. Fair trade

We think about fair-trade products are those produced in the developing countries. But why shouldn't domestic trade be fair, too? My customers enjoy knowing that their money goes directly to support the beekeeping family they know and trust. To the point that even when I offer a discount, half of my long-term clients do not use it. One of them wrote to me in a recent email, after ordering another 10 jars: "I never used any of your 10% off coupons, Leo! Marketing has its wonders I guess!"

30. "Thank you!"

I put it here last, but for me this point actually comes first and permeates all the others. This is what beekeeping means to me.

I feel sincere gratitude to every person who buys my honey. I am seeing a tremendous amount of environmental destruction happening around. Over the last thirty years the area I live in lost *half* of its forests. Of my six neighbors, three logged out their land in the past seven years. They call it "land improvement." Lush bee pastures are being bulldozed and converted to fields of sunburned fescue to feed the cows.

I support local bees and the bounty of local wilderness that sustains them and us. My customers support me and my work. So I always begin by saying a big *thank you*!

The long list of the amazing properties of my honey is not supposed to overwhelm my customers or be a substitute for actually *tasting* it. So there I stop.

And if you would like to support my work and try our Ozark Wilderness Honey, please visit horizontalhive.com/honey (Or, to order by mail, send a check to Leo Sharashkin, HC 73 Box 470, Drury, MO 65638. $10 for a 4-oz sample, $18 for half-pound, or $25 for a full pound, shipping included. Packed in gift-quality amphora-shaped glass jars.) *Thank you!* BC

Dr. Leo Sharashkin is editor of Keeping Bees in Horizontal Hives: A Complete Guide to Apiculture. His forest apiary in the Ozarks is composed entirely of local survivor-stock bees obtained from the wild using swarm traps. His website (including free plans, advice, and talk schedule): ***www.HorizontalHive.com***

Urban Forests

Plant City Trees For City Bees

Christine **Taylor**

It starts in the trees, densely covered with thousands of flowers give bees an eco-rich source of nectar and pollen. However, a new executive order designed to make the EPA revoke our most crucial public health and climate protection puts a price point on climate dangers that bees are facing every day. According to the Environmental Working Group, a non-profit, non-partisan organization dedicated to protecting human health and the environment states, "Pollinators, like bumble bees, are essential to producing one in every three bites of food we eat."

Redbud

The health and survival of bees are not just in suburban and rural beeyards or hollowed out trees. Unbeknown to many people, urban areas can also accommodate bees. Weronika Banaszak-Cibicka's article, "Urban Forest & Urban Greening," writes "the mosaic-like character of urban environments may create favorable living conditions for various populations of bees."

Let's not wait for big government. Today, we must find ways to help bees. Every year horticulturists attract bees by planting flowering annual and perennials in their flower beds. However, they may be less familiar with earning carbon credits as bees forage for pollen and nectar up in the tree canopy.

Fortunately, Urban Forest Carbon Registry, a non-profit organization based in Seattle, Wash., created a carbon credit program for individuals and businesses in urban areas to reduce carbon footprints. This program will ultimately assist bees to thrive as it connects urban tree planting and preservation projects with carbon buyers and sellers who want to reduce their carbon footprints.

You may be thinking, "How in the world will planting city trees increase our bee population?" Yes, trees clean the air, curb stormwater runoff, raise property values, sequester carbon, and reduce energy costs, but trees are also a source of food for bees.

According to Peter Wohlleben:

The pleasantly perfumed invitations sent out by tree blossoms do not release scents at random or to please us. Fruit trees, willows, and chestnuts use their olfactory missives to draw attention to themselves and invite passing bees to sate themselves. Sweet nectar, a sugar-rich liquid, is the reward the insects get in exchange for the incidental dusting they received while they visit. The form and color of blossoms are signals as well. (The Hidden Life of Trees, pg. 242).

Planting a variety of trees creates a myriad of benefits for bees and accommodates multiple bee species. Heirloom Gardener also emphasizes that "increased diversity and security of nectar and pollen sources benefit bees in a manifold of ways, such as reduced stress, increase life span, heightened immune system response more precise communication and yes, increased honey."

So how do you get carbon credits for planting a di-

versity of trees in urban areas? According to Mr. Mark Mcpherson Executive Director of the Urban Forest Carbon Registry, "you must own the land and the trees in addition to submitting an application adhering to the protocols set forth to earn certified carbon credits." One protocol of tree planting requires that the urban area is "defined by the most recent publication of the United States Census Bureau."

Once your application is approved Mr. Mcpherson states, "you are responsible "for all aspects of the project, including documentation, reporting, and record-keeping." By the way, businesses, non-profit entities, or quasi-governmental bodies like utilities can take advantage of city tree planting projects.

Need more bee supplies like queens, candles, or any of the many bee related items? Any time after five years of your tree-planting project, you can request verification and issuance of credits by the Registry to sell your carbon credits. However, during those five years bees are foraging and flourishing.

Mr. McPherson also suggests, "to maximize carbon credit, plant trees that will grow to have large trunk trees, conifers will help." Most importantly we also want to plant trees to help bees.

So which large trunk trees will qualify for carbon credits and also help bees? Bee Bee Trees can grow 30 to 50 feet tall or more and is usually just as wide. Oak trees house different pollinators and bees often return for years to come.

Bees are very appreciative of the presence of Tupelo trees by giving us the cream of the crop – Tupelo Honey. Tupelo trees also "serve as an important late-spring food source." Bees also flock to the blooms which burst with sweet nectar from Yellow Poplar or Tulip trees. According to the Arbor Day Foundation,"Yellow Poplar are one of the largest of Eastern hardwood trees."

From early Spring through late Summer trees offer food for bees. According to Denise Ellsworth from the Department of Entomology at Ohio State University, she states:

Significant bee foraging activity on trees such as Carolina silverbell (Halesia Carolina), seven-son flower (Heptacodium miconioides), Goldenrain tree (Koelreuteria paniculata) and Jampances pagoda tree (styphnolobium japonicum) are just some of the trees that can be planted in urban settings.

Other bee loving trees to consider planting are the American Linden or Basswood (Tilia Americana). It can grow to a height of 50 feet and approximate width of 30 to 35 feet. The Southern Magnolia grows to about 35 feet tall and 25 wide. The Chokecherry and Redbud trees are a little smaller. They grow to a height of approximately 20 feet and 15 to 25 feet wide. Crabapple and Serviceberry are small but bee loving trees.

Urban community gardens are one facet of urban tree planting and an excellent place to plant Apple, Plum or Black Cherry trees. Honeybees relish the nectar and pollen while they expand the fruit crop, and we get to savor the results!

An unknown author states, "A bee's favorite colors are The continued survival of bees is not something to take lightly. Deciding to plant trees in urban areas for bees will afford them more food, shelter, and reduce our carbon footprints. There's a global need to repair the bee colony, but if we act locally, our efforts will produce more pollinators. BC

Bee Venom Therapy

Ross **Conrad**

If modern medicine is unable to help you, try Bee Venom Therapy (BVT) . . . you have little to lose.

The use of honey bee products for healing and health (known as Apitherapy) has been in use since ancient times, however, the most attention grabbing apitherapy treatment today tends to be the use of bee stings to reduce disease symptoms. The use of BVT for rheumatic diseases has been recognized for at least 2500 years. (Broadman 1962) While the majority of therapeutically applied bee venom is through injection in the form of desensitization shots for people suffering from hyper-allergic reactions to honey bee venom (anaphylaxis), anyone with access to a hive can obtain venom from the self-contained, self-sterilizing, self-injecting bee venom applicators living within.

An evolving experimental treatment

While bee venom injections are not yet approved by the medical establishment for use treating rheumatic diseases, the sting from the live bee is often used and found helpful for this purpose. Treatment typically consists of applications of bee stings three times a week, about every other day. Treatments are applied over the body on a rotating basis so that a former treatment area is not treated again until all symptoms of the previous stings have healed. This form of BVT is available almost anywhere and, as long as the patient is not hyper-allergic, the treatment is safe without long-term adverse effects even with long-term application of therapeutic doses.

No one has worked as long or as hard to promote the benefits of BVT as Charles Mraz who is recognized the dean of the therapeutic use of bee venom in the United States. Not only did Mraz initiate clinical research in conjunction with the scientists at Sloan-Kettering and the Walter Reed Army Institutes, he developed the USDA purity standard for dried whole venom and supplied venom to pharmaceutical companies worldwide. He went on to become a co-founder of the American Apitherapy Society (AAS): a clearing house for information on apitherapy, which to this day dedicates itself to carrying on Mraz's legacy by educating the public and health care community about the traditional, clinical and scientifically proven uses of apitherapy.

Rheumatic Disease

While no medical treatment works on everyone 100 percent of the time, most forms of rheumatic disease seem to respond to BVT including gout, osteoarthritis, bursitis, tendinitis, fibromyalgia, lupus, and scleroderma. However, the use of BVT for treatment of rheumatoid arthritis is the area most widely documented (Kwon 2001, Kang 2002, Lee 2004, Park 2004, Yin 2005, Hong 2005). The only cases that do not respond well are where the joints have deteriorated to the extent that there is bone-to-bone contact within the joint and where the bones have deteriorated. While BVT can help with some of the pain symptoms of rheumatic disease, bee venom cannot stimulate the growth of new bone and cartilage.

Although the use of BVT has proven to be clinically valuable in the treatment of chronic pain symptoms research into this area of BVT continues to evolve (Lee 2008). There is also significant research indicating the BVT may help in cases of malignant melanoma, basil cell carcinoma, lymphoma, breast and prostate cancer (Liu 2002, Son 2007, Liu 2008, Park 2011, Oršolić 2012, Mao 2017). BVT also has the potential to help reduce negative reactions to chemotherapy (Al-Atiyyat and Obaid 2017)

BVT has been associated with increased fertility in sterile women and curing miscarriages, but also with increased risk of miscarriage in newly pregnant women. Additional conditions that have been successfully treated with bee venom include; multiple sclerosis, post herpetic neuralgia (shingles), chronic pain syndromes, eczema, psoriasis, sclerosis, corns, warts (including planters warts), Epstein Barr virus (EBV), Lyme Disease, mononucleosis, premenstrual syndrome, menstrual cramps, irregular periods, mood swings, depression, and hypoglycemia.

Bee Venom Collection

Significant amounts of honey bee venom are required by the pharmaceutical industry. In order to provide them with the raw material they need to produce desensitization shots for those who are allergic, beekeepers collect and purify the venom. One way this is done is with a frame embedded with wires that are hooked up to a battery. Under the wire grid is a plastic sheet covered with a rubber membrane. The venom collector is placed up against the entrance to a hive and the hive is kicked in order to elicit a defensive response. When the bees come out, land on the collector and touch any two wires, they get a hot foot and sting the rubber membrane beneath the wires depositing their venom beneath the rubber. The venom that is collected is then dried, filtered and purified in an autoclave before being shipped.

Apitherapists avoid all the work involved in collecting bee venom by using live honey bees. Charles Mraz would re-

use an old mayonnaise jar with holes punched in the lid for air to collect and store bees for BVT. Before collecting the bees, a tablespoon of honey is placed on the bottom of the jar and a piece of paper towel, large enough to just cover the bottom of the jar, is placed over the honey. This prevents the bees from wallowing in and potentially drowning in the honey. Charles also would place an empty toilet paper roll in the jar to provide a place for the bees to cluster.

Once the jar is prepared, collecting the bees was as easy as going out to a hive and rattling the jar over an upper entrance in order to stimulate the guard bees to come out and defend the hive. When the desired number of bees is in the jar, it is simply slid across to the edge of the hive and the lid placed on the jar.

Bees are stored in a jar with honey covered by a single layer of paper towel. The towel absorbs the honey and the bees can suck it up while standing on the towel and avoid drowning in the honey. Note a toilet paper core is included to provide a clustering place for the bees and has been cut on both ends to help prevent it from rolling around inside the jar.

Honey Bee Storage

Once the bees are collected, it is best to store them in a dark, quiet place for a while. If necessary, I wrap a dark cloth around the jar to prevent the bees from racing around and around the jar using up their life energy trying to get to the light they see through the glass. This also encourages the bees to quiet down and cluster making them much easier to grab them when the time comes to remove them.

If the bees are to be used for BVT shortly after they have been collected and they are energetically running around the inside of the jar, the container can be placed in the refrigerator for a few minutes. The cold greatly decreases the activity level of the bees making them much easier to catch. Care must be taken not to leave the bees in the cold too long or they will enter a state of torpor where they allow their body temperature to get very low in order to conserve energy. Bees in the torpor state will not readily sting when prompted and must be warmed back up before being used for BVT.

Choosing the sting site

Charles Mraz developed a technique for choosing a sting site by pressing firmly along the joints and bones looking for spots that were sensitive and painful when pressed. He called these "hot spots" and would mark them with a pen or marker whenever they were discovered. This provided a bull's-eye target for the actual sting. Interestingly, these "hot spots" often coincided with the body's meridians—the places that acupuncturists insert their needles. Stings applied to these meridian points give greater results than when applied in other areas. (Lee 2005) Some even hypothesize that the honey bee was the first acupuncture needle ever used.

Applying Stings

To help reduce the initial pain of the sting, extreme cold is applied to the ink mark area through the application of ice wrapped in a damp cloth or an ice-pack. The ice is applied for a minute or two in order to numb the sting site and reduce the initial pain associated with the sting.

Once the area is adequately numbed with ice, a bee is removed from the jar and the tip of the bee's abdomen is applied to the ink mark. Eight to 12-inch forceps are the perfect tool for removing bees from the jar. It is important to try and grasp the bees by their head or thorax rather than the abdomen, since grabbing the bee by the abdomen may damage the stinging apparatus preventing the stinging mechanism from working.

If a person has not received a bee sting within the past two weeks, it is prudent to try a test sting before applying full stings to be sure they have not become hyper-allergic. To apply a test sting simply scratch out the honey bee stinger within a split second after it has become imbedded in the skin. Then wait for 15-20 minutes and monitor the patient. If they do not experience symptoms associated with anaphylaxis, such as fainting, loss of blood pressure, and breaking out in hives all over the body, then BVT can proceed with full strength stings.

How BVT Works

The primary purpose of BVT is to stimulate the body's immune system so that it can begin to heal itself. Once the stinger is imbedded in the skin, it pumps venom into the sting site. In reaction to the foreign substance entering its system, the body sends large amounts of blood to the area. This concentrates the healing properties within the blood around the sting site. In order to receive a full dose of venom, the stinger is left in the skin for at least 10-15 minutes. During this time the stinger is acting as an acupuncture needle as mentioned above.

The impact of the BVT treatment goes much further however. Dr. Artemov of Gorky University was among the first to prove that the bodies adrenal glands are stimulated by venom to release cortisol. Cortisol is the natural version of the steroid, Cortisone that is commonly used by physicians to treat arthritis and other cases of inflammation. While it is close, Cortisone is chemically not exactly the same as the Cortisol that the body produces and over time patients can develop liver toxicity from Cortisone treatment. It is believed that the body requires various B vitamins and vitamin C in order to produce Cortisol. Thus it is recommended that for best results, people obtaining bee stings for therapeutic reasons take 1,000 to 2,000 milligrams of vitamin C and a tablet containing multiple B vitamins about one hour prior to receiving BVT.

By pre-marking the sting sites, BVT can be targeted to specific points on the body.

Items that you may want to have on hand when giving, or receiving, bee venom therapy. Unless side effects of stings become unbearable, only herbal salves and the homeopathic remedy, Apis Mellifica, should be used as they will not suppress the bodies immune response while they reduce the bodies reaction to the sting.

Side Effects

As with any treatment, there are side effects that can be expected from BVT treatment. While not everyone will experience all of the possible side effects, the most common side effects include the initial pain of the sting, as well as swelling, redness, itching, soreness and tenderness, feelings of heat in the treatment area, and in extreme cases nausea and fever. It is important to note that none of these localized reactions are typically life threatening. A life threatening anaphylaxis reaction will affect the entire body.

The public's usual response to a sting reaction is to take an antihistamine. Liquid antihistamines sold for children will be absorbed by the body the quickest providing the fastest relief. A more powerful antihistamine is sold under the brand name, Zyrtec, and used to only be available by prescription but now can be purchased over-the-counter.

The problem with taking antihistamines for uncomfortable reactions to BVT is that they suppress the body's immune system. Since BVT is practiced in order to stimulate the body's immune response, drugs that depress the body's immune system are contraindicated. It is preferable therefore to use the homeopathic remedy, Apis Mellifica, should the side effects of BVT become too uncomfortable, since the remedy can reduce symptoms without suppressing the immune system. Similarly, one should avoid the use of alcohol during bee venom therapy, since alcohol also suppresses the body's immune system.

Although it is extremely rare, about one percent of the population is hyper-allergic to honey bee venom and will experience anaphylaxis. For this reason, it is prudent to always have an epinephrine injector (brand name: EpiPen) on hand when giving or receiving BVT and always apply a test sting first if the person has not been stung within the past two weeks.

American Apitherapy Society

As a benefit of being a member of the American Apitherapy Society, the AAS will provide you with a free prescription for an epinephrine injector if you need one. The AAS also provides members access to a list of AAS members who reside throughout America and around the world. This apitherapy network can provide information and assistance with most all aspects of apitherapy. This includes everything from where to source honey bees, to being able to post questions on the AAS forum that experienced apitherapists will answer. Questions can include anything from what type of apitherapy is recommended for certain conditions, to what protocols one should follow when treating specific conditions and what results other apitherapists have experienced when treating various diseases. The list can also be used to find an apitherapist in your area who may be able to treat you. For over 100 years honey bee venom has demonstrated its efficacy in thousands of cases and the hundreds of papers written and published in the U.S., Europe and other countries. Charles Mraz believed that this provides a solid foundation on which to build an exciting new field of immunotherapy medicine.

For More Information Contact: the American Apitherapy Society **http://www.apitherapy.org/contact/** BC

Ross Conrad is the author of Natural Beekeeping: Organic Approaches to Modern Apiculture, 2nd Edition.

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Beeyard Thoughts, Observations, and Updates

Processing thick honey from heavy combs. An aggressive colony in a suburban area.

My opening comment last month

For this continued honey processing topic, I can't write an article opening that is any better than the one I used to open my *Bee Culture* piece last month. Though I said that my obligation was over, the *old thick honey* saga really didn't stop last month. Here is the reused opening:

> ***Extracting from cold, older combs***
>
> *I am so, so sorry I started this topic. Last month I boldly said that I would finish my comments on late season (or out of season) honeycomb extraction this month (April). That was just a bit optimistic on my part. However, I have made progress.*

This is an update to my previous *old honey* update. You see I still had extracting to finish after the monthly article was complete. I feel that I have been clear in my appraisal of this interminable task – it is not enjoyable work. As I was heating, uncapping, and extracting the remaining old combs, yet another cockamamie idea struck me.

> *"Since much of the honey remains within the combs that I will be putting back on the colonies for them to clean, what if I uncapped the heated combs and then gave the uncapped and unextracted combs back to the bees."*

I anticipated the bees removing the uncapped honey, using some of it, then restoring and recapping the remainder. As it were, the bees would essentially recycle the thick dark honey. I have never heard of such a thing but was keen to try it.

I selected strong colonies and gave them about seven to eight crudely unextraced combs in a deep super. I put the deep on the very top of the hive and soundly closed all but the lower entrance to preclude robbing. I know what you are thinking – what an awful job to give my unsuspecting bees. I suppose it was. My doomsday plan was to give the bees a shot at it. That not working, possibly I could – yet again – bring it back and go back to the extracting grind.

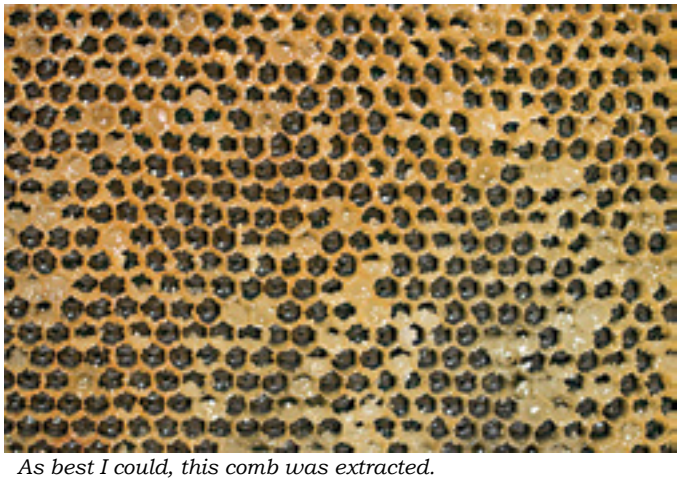
It worked – but not what I expected

I eagerly had a look the very next day. Bees were on the combs, but if possible – they seemed surprised – agog – overwhelmed --- they seemed something. No bee in the colony had ever been assigned such a task. *(I have no photos of the uncapped frames. Dripping, sticky, messy and my camera in the middle of this situation – didn't happen.)*

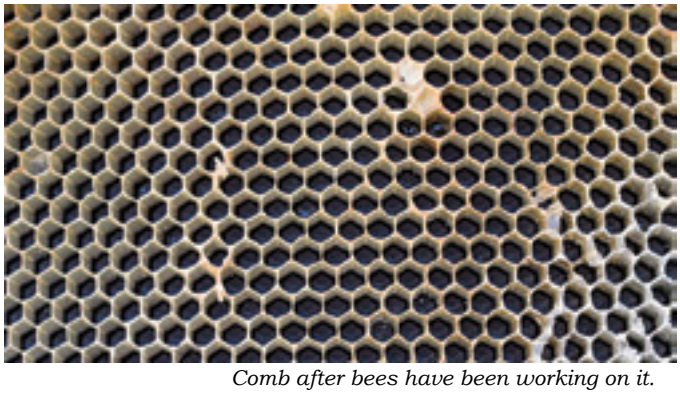
I would like to reuse a photo I used last month. It makes a point of what the bees confronted.

Though nearly all of the honey has been removed, the rebuilt comb is still unfinished. The cells have not been repaired – only the honey has been salvaged. It appears to be turning up in other frames and, in some cases, on the same frame. There is not a strong flow ongoing and the bees have plenty of combs for storage. They would not be producing new wax for comb repair under these conditions.

However, I can now remove these cleared combs in anticipation for later this season or in future seasons. The equipment is profoundly lighter. Please know that this was a lot of work. It would be much better to



As best I could, this comb was extracted.



Comb after bees have been working on it.

extract at the end of the production season rather than go through this process. Sometime, things happen that can't be helped.

I should note...

I should note that some of the comb cells are a bit distorted. This characteristic is somewhat noticeable in the photo on the previous page. The cells on the left appear to be slightly facing to the left while other cells appear to be facing straight ahead. This is not camera lens parallax. While visually looking at the comb, the blemish is slightly apparent – very slightly. I suspect that the heat caused the wax to distort under the weight of the hot honey. When a flow is on, I will watch to see how the bees handle this slight distortion.

Is this project ever going to end?

Before I wore myself out trying to process these combs, I did acquire about six gallons of unfiltered honey. It seems fine, but it has been through a lot for the past two years. I would not be eager to eat it and don't want to sell it either (or worse – give it away). As the season passes, I plan to dilute it just a bit and feed it back to the bees. Do any of you have experience feeding honey back to a colony?

A beekeepingly-unnerving event

Last Spring and this Spring, I began to acquire swarms that did not appear to be mine. I acquired three last year and – so far – two this year. The swarms are moving into empty stacked equipment that I have sitting around in my apiary. This season I was there when both swarms moved in so I could confirm that they were not coming from any of my hives – unless they left on a previous day – pitched on a limb somewhere, and then moved back to my yard. While this could have happened, that scenario seems contorted. I saw no unusual signs of swarm cells in my colonies. I do admit that I really want these five swarms to be new bees and not simply my bees swarming.

The feisty one[1]

One of last year's swarms seemed particularly feisty and possessive. Though it was happy in my equipment, it was never very happy with me. But all things considered, last year we tolerated each other.

However, this year something went over the edge. As has always been my nature, if I am at home and doing something other than bees, once or twice per day I casually wander back to my apiary.

About a month ago, on one of my wandering trips to the apiary, as I was pensively standing there – considering the world – a bee or two came for me. I mean they were coming to get me – not just send me from the area. Slapping and swatting – this was not enjoyable, and I felt that the attack was underserved. It began to be a regular event. I began to put on a veil as a matter of course just to have a quiet walk. As the season progressed, I commonly had eight to 10 bees bombarding me. No problem with a bee suit on, but this behavior was completely new to my apiary. Then it began to get complex.

As I normally do, I bought a few packages for photographing and writing topics and a couple of queens for making splits. When I went to the bee yard to check the progress of these new bees and queens, I had these aggressive bees all around me. But here's the bee rub – I could not tell exactly from which hive or hives these nasty bees were originating.

As I write this – even in the presence of new beekeepers – I need to say that this was getting to be an unpleasant situation. I named the hive(s) my sentinel hive. It protected my entire apiary. As I opened the stockade fence gate surrounding my apiary, they were immediately there. I made rounds to all the other hives and could not tell that there was any entrance confusion coming from any of the hives. This situation was evolving in a suburban bee situation that was not enjoyable.

I considered this....

By putting that uncapped honey on three colonies that I discussed above, had I upset the mood in the beeyard? I was specifically careful to only have one entrance and to put the uncapped frames on top of the colony far away from the entrance. There was no mess, but in some way did I trip a trigger? I toyed with this idea for a couple of days before deciding it was not the issue. Inside the colonies where the uncapped honey-cleanup work was being completed, all was serene and calm. There were no indications of robbing or other beehive conflicts.

Not knowing what else to do...

Without real proof, I decided to blame the testy colony. You might say, *"Couldn't you tell by standing near other colonies?"* No. There were bees everywhere – flying about in a normal manner except for the ones that were attacking me. So there were normal and abnormal bees everywhere. I simply could not tell from whence the malcontent bees came.

Then everything blew up...

It was a particularly pretty day. Regardless of my *Jerk* bees from the uncertain sentinel colony, I did bee work. It was a good day for sound protective gear and gloves. Being springtime, grass grows so my neighbor began to cut his. As he started, I shut down all operations, smoked everything, and left the scene, but I did realize that I needed

Odd for me, I made no photos of the aggressive colony during daylight. This is the split and the parent (suspect) hive is to the right. Nothing special to see in the photo. At night, they were calm. Did they deserve to die?

[1]This was a populous colony. In an effort to control swarming, I split the original colony into 1/3 and 2/3s. I did this before the colony(s) became a nuisance.

A moving screen. I also put one on the bottom with screen side down. The confined colony had plenty of ventilation.

I used an inner cover on top to prevent the eight-mesh screen from crumpling under strap pressure. Note the bottom deep screen inverted to allow for bottom ventilation.

to confess to him that I had an issue with my bees that I had never had before.

I told him the next day. He responded that a lot was happening in the back corner of our yards. He said that yellowjackets came after him the previous day and stung him three times. He had to quit mowing, but did spend time looking for the ground entrance to the yellowjacket nest.

I confessed all. It was far too early in the Spring for yellowjackets. I felt terrible (should I uppercase and bold, *terrible*?) My idiot bees went onto his property and stung him three times. I should tell you that my tolerant, friendly neighbor has had a profoundly serious medical procedure that is presently under control. It is **not, not, not ever** okay – **ever** – for my bees to torment him as he goes about his private business.

Later during the same day, my neighbor's wife told my wife that several bees had also buzzed her the day before. She was about 40 yards from my apiary. She was not stung – thanks and thanks again for that gift. I have never had bees act like this in my Ohio life and especially in my home yard. I am completely responsible for my bees and had to do something dramatic.

I decided to kill the suspected colony

I don't even want to write about the possible legal and personal ramifications of where this situation with uncontrolled marauding bees could go. In total frustration, I made the decision to kill the suspected colony and do it quickly. Note this. I have never intentionally killed a bee colony that was not in some way an Africanized colony or a colony afflicted with American foulbrood. Even then, the task was enormously distasteful.

Then came a temporary reprieve...

Editor Kim and I talked. He knew of a desperation technique for efficiently killing a colony to the very last colony member. That became my plan. But as a few hours passed, I waivered. I was not 100% sure that this was the colony – maybe all of my colonies were involved in some way. What an unpleasant thought that was. Either way, I had to be sure before I just willy-nilly started killing selected bee colonies.

A different amazingly good friend...

A good friend and beekeeper himself said I could put them on a remote part of his wooded property

Bob R. and I were thankful that it was only two hives. This was not an easy location.

The relocated colonies with the attitude problems.

about thirty miles away. I was still not solving the problem, but I was moving the hot bees away from all human life – except the occasional hunter.

The move...

There was nothing special about the move. Typical night work and all that go with it. I did use heavy-duty moving screens. They were simply deep supers with eight-mesh hardware cloth stapled to cover the topside.

I used slats that were screwed to the hive sides. I also used a heavy ratchet strap that would encircle the entire hive. I did not mean for these hives to break apart during the relocation.

My bee friend, Bob R. helped load the two hives (a split and the parent hive) onto my truck and away we did go. The ride was uneventful. The final leg of the trip was a four-wheel drive experience, but Bob and I wanted these accused colonies away from civilization. It was bit of a pain to move to the final location, but a heavy yard wagon was put to great use.

What now?

I put them back together. Of course they were testy. They had been confined and jostled for many miles, but they found the hive structures in short time. My truck is in the remote background. The bees only followed about one-third of the distance back. I am going down tomorrow to look for queens in one or both hives. They will be eliminated. No reprieve there.

Back in the home yard, it has rained a lot, and a couple hundred of the testy bees were left behind. But today, three days later, things do seem much quieter; and my neighbor cut his grass for the first time since the event. If there are more events next month, I will give you a quick follow-up.

Killing bees is ugly, but sometimes....

At a meeting last night, a beekeeper made a special trip to his vehicle to bring in a leather glove with hundreds of stingers still attached. He described a colony worse than mine. After just a few days, he eliminated it before it began to attack his farm animals and chickens. He described bees that would follow him one hundred yards.

How much of this goes on amongst you beekeepers? I sense that this procedure is one that is not spoken of very often. Do any of you have stories?

That's it.

Thanks for reading and please don't be unhappy with this discussion. This event is a rare one for me, and it was not a happy time. I may be on the way to turning things around. I'll let you know. BC

Dr. James E. Tew, State Specialist, Beekeeping, The AL Cooperative Extension System, Auburn Univ; Emeritus Faculty, The OH State Univ. ***Tewbee2@gmail.com; http://www.onetew.com; One Tew Bee*** *RSS Feed (****www.onetew.com/feed/****);* ***http://www.facebook.com/tewbee2; @onetewbee*** *Youtube:* ***www.youtube.com/user/onetewbee/videos***

Ann **Harman**

This year, 2017, marks the 100th birthday of the North Carolina State Beekeepers Association. The first meeting was held in Winston-Salem. The site was probably chosen as being a large city (for that time) and located centrally in a long state. It also was an important railroad stop. North Carolina stretches 560 miles from the Atlantic Ocean to the Appalachian Mountains in the west where Mt. Mitchell, at 6684 ft, is the highest mountain in the eastern U.S. North Carolina is nicknamed the Tar Heel state from a comment made during the Civil War. Their soldiers "stuck to their ranks like they had tar on their heels."

A very famous event occurred on December 17, 1903, about four miles south of the town of Kitty Hawk, NC. The Wright brothers flew their airplane on the sandy hills. The two brothers, Orville and Wilbur, were great friends of Amos Ives Root, the beekeeping founder of the Root Company. A.I. Root, fascinated by the possibility of powered flight, paid many visits to the Wright brothers' experimental flying grounds near Dayton, Ohio. Little attention was paid by the local and national press, but Root published accounts in his beekeeping magazine, *Gleanings in Bee Culture.*

The dates for the first North Carolina State Beekeepers Association, NCSBA, were January 11-13, 1917. Wintertime was probably chosen as a quiet time for farmers and beekeepers. They would have come by horseback, horse and buggy, train and perhaps a very few by automobile. Those riding by train from the west got stuck in a snowstorm and missed the meeting. The logistics of holding a meeting were considerable. Speakers were invited from near and far. First the organizers had to find enough hotel rooms for speakers and the beekeepers. Then stables for the horses had to be arranged, as well as sufficient hay for them to eat.

Forty beekeepers attended the first meeting, considered so successful that the membership could rise to a hundred. Those members would be astonished today – NCSBA membership of around 4000 and meeting attendance of 400-600. Seventy-five local associations are active throughout the state.

The first meeting had 11 presentations. The topics were not so different from those of today.

Beekeeping in Work of County Farm Agent and First Impressions in Beekeeping Extension Work showed that local beekeepers were kept informed about new developments. Diseases, of course, were important. One talk covered American foulbrood and another was about European foulbrood. Today we have our urban beekeepers. Then, E. W. McNairy spoke on Beekeeping as a Side-Line for a Town Man.

No state meeting would be complete without nationally-recognized speakers. In 1917 Dr. E.F. Phillips, Apiculturist, Bureau of Entomology, USDA, Washington, D.C., gave his first talk on a familiar topic even today, Importance in Swarm Control. His second presentation was Visits Among American Beekeepers (by lantern). In 1917 that meant he would be showing photographs with a 'magic lantern,' an early form of a slide projector. The photographs were taken on glass slides in those days and could be projected onto a wall.

The other featured speaker was E.R. Root of the A.I. Root Company, Medina, Ohio. His first topic was Wintering. That certainly is a current topic at beekeeper meetings. It would have been interesting to hear his second presentation – Bees in Pound Packages. That, too, can be heard at meetings today.

Much time, including after dinner, was spent on the organization of the association. The constitution was written and numerous other organization details were accomplished. In a short time the North Carolina State Beekeepers Association was a reality. Dr. Phillips commented "No state has held 10 meetings equal to this, and there is no state whose first meeting equaled this."

Celebration of the 100th year will take place in Winston-Salem July 13-15, 2017. Nobody will get stuck in the snow this time. The

E.F. Phillips

organizers will not have to search for either hotel rooms or stables and hay for horses. But they have been busy with other details to make the celebration meeting memorable. The speakers' topics, although similar to those in 1907, will reflect 2017 and the advances made in 100 years. Dr. David Tarpy, North Carolina State University along with John Zawislak, University of Arkansas; Dr. James Wilson, Virginia Polytechnic Institute and State University' and Katy Evans, Pennsylvania State University will give presentations – with Power Point, not with lantern slides.

The association has initiated a fund-raising campaign to build a new field honey bee lab for research done at NCSU. Plans for this facility will be shown at the meeting with request for donations. Memorabilia will be available. A commemorative t-shirt to wear and a license plate that can be displayed on the vehicle front will be for sale. For a number of years NCSBA has held a Honey and Honey Cookery Show. A cookbook had been compiled with 300 prize-winning recipes, all using honey. BC

Visit the NCSBA website **www.ncbeekeepers.org** for complete details of the 100th celebration meeting.

Pacific Northwest Foraging

Connie **Krochmal**

In this series thus far we've jumped hither and yon over much of the West. This month, we'll focus on the Northwest. "Pacific Northwest Foraging-120 Wild and Flavorful Edibles from Alaska Blueberries to Wild Hazelnuts" by Douglas Deur (290 pages, ISBN 978-1-60469-352-2) was released by Timber Press.

This volume covers Washington and Oregon as well as parts of Alaska and Canada. Since it turns out that about seventy of these edible species happen to be pollinator plants, I highly recommend this title to beekeepers. Many of the plants or their relatives can be found in other regions as well.

Around half of the pollinator species in this volume have been profiled over the years in *Bee Culture* articles. Bear in mind that there has been some overlap in these books with some plants being featured in more than one volume. Around 25 species for bees that I mentioned in previous reviews are also in this title, so I won't bother repeating them here.

In addition, this volume has a number of other pollinator species that haven't been covered in earlier articles. Those plants providing surplus honey are arrow-head, waterleaf, and Labrador tea. Ones that are sources of nectar and pollen are balsam root, chicory, and Indian peach. Yerba buena brings nectar, while the western skunk cabbage is rich in pollen. In addition, biscuit root is a source of pollen and possibly nectar.

Like the other volumes in this series, this one has the plants arranged alphabetically by common name. The in-depth plant profiles feature the Latin and common names, the edible plant part/parts, plant description and ID tips, where and when the plant can be found, how to prepare the food, stewardship guidelines regarding replanting the species in the wild, and safety concerns.

The introduction covers the many reasons for foraging and the various habitats within the region and the edible plants present in each habitat. The author stresses the need to be certain about plant ID when foraging.

He purposely chose more flavorful species that are plentiful, and are either easier to collect or require less time to gather. In addition, rare or threatened species or those that can be confused with a toxic look-alike are excluded from this volume. The seasonal foraging guide lists the plants by plant part/parts for each season and habitat.

The author is a specialist in Native American traditions and serves as a cultural ecologist for native peoples of western North America. This serves to explain why he stresses the role these plants play in Native American communities as well as the issue of sustainability both in the introduction and in the individual plant profiles.

Of the many excellent pollinator plants in this volume that will be of interest to beekeepers, I've chosen salal and the American cranberry partly because they can be grown in the North. Both of these species happen to be members of the heath family, which means they're relatives of the blueberry.

Salal

Salal (*Gaultheria shallon)*

There are several related species in this genus, including wintergreen. However, I found no indications that any of these relatives are sources of pollen or nectar. Salal is an evergreen shrub that is native to Alaska, Washington, Oregon, and California.

This species is most often found on wooded slopes, clearings, clear cuts, open areas, and the redwood belt as well as an understory species. Salal was one of the plants reported by the Lewis and Clark Expedition. In December of 1805, Clark wrote about having been served foods prepared by Native Americans that contained the berries.

The plant's height as well as the growth habit is largely determined by the growing conditions. When given poor sites or full sun, salal will assume a mat-like habit and usually be less than a foot in height. On the other hand, in full shade the plant will develop more luxuriant growth and be taller – five to seven feet in height or more with a spread of three to eight feet.

Spreading by stolons, salal can continue to become wider each year so that eventually it can form a thicket. This attractive shrub produces arching stems.

Clark described the older bark,

particularly on the larger stems, as being greenish-red and that of the younger stems as red when growing in full sun. The lovely, shiny, leathery, bright green foliage can be round to oval. The margins are typically undulating.

With red undersides, the leaves range from 1¾ to five inches in length. Borne on long red shoots, the foliage is so attractive that lots of the cut stems are harvested in the wild each year. These are sold to florists, who use them in floral arrangements.

Borne in showy clusters that are three to six inches long, the axillary blossoms of salal resemble those of the blueberries. The waxy, bell-like blooms are mostly white tinged with pink. Sometimes, they can also be pink. About ½ inch in length, these appear from March through June, depending on the location.

Salal berries emerge in slender, drooping or arching clusters on the current year's growth. One-half-inch wide, the fruits ripen in Fall to black or purple. They pretty much resemble huckleberries. and are typically made into syrups and pemmican. Each cluster contains ten to twelve fruits.

Growing Salal

This native thrives in the West and can be grown successfully in parts of the East provided it is given suitable conditions. In western states, salal is reasonably hardy in zone six, although some dieback might occur in colder areas when Winters are particularly severe.

For eastern gardeners, salal is most suited to zones seven and eight. It has sometimes been grown successfully in the Northeast in dry shade and full sun. In warmer areas of the East, the plant likes some shade.

Preferring a somewhat dry to moist soil, the vigorous plant loves acid conditions. Salal is a great choice for rock gardens and landscapes. As a ground cover, it is ideal for banks and mass plantings. Several cultivars are available.

Rarely needing pruning unless it has become terribly neglected and overcrowded, the plant generally requires minimal routine care. This is best planted in the Fall using either container plants or sod.

This is propagated by seeds and cuttings. The spacing does vary slightly by growing conditions. Space the plants four feet apart in the shade and about half that if planting in full sun.

American cranberry blossom.

Bee Value of Salal

Around a century ago, salal was a major honey plant in the area. Since that time, the plant has become less common due to various factors, such as logging, land use change, and development. The blossoms produce a lot of nectar.

Honey surpluses are possible when the plants are plentiful. The pleasant tasting honey is light amber.

American cranberry or large cranberry (*Vaccinium macrocarpon)*

The Latin species name refers to the large fruits. This native is found in Washington, Oregon, California, Minnesota, Wisconsin, Michigan, Indiana, Illinois, Ohio, and throughout the Northeast southward into Tennessee, West Virginia, Virginia, and North Carolina. Its habitats include bogs – especially sphagnum bogs – swamps, wet shores, mountains, and coastal plains. In the past, the Nature Conservancy has offered public tours during the Fall of a cranberry bog it owns in Shady Valley, Tennessee.

Suitable for zones three through seven, this dense, low growing, fine textured evergreen ground cover is creeping or trailing. This native is only one to six inches in height with an indefinite width. The plant spreads by the ground-hugging, forked, very thin stems that can root at the nodes. The stems can be three foot in length.

When it initially emerges, the new growth typically has a bronzish cast. The edges of the closely spaced foliage tend to curl backwards. The blunt, rounded to oblong-elliptic, shiny leaves are ½ to ¾ inch long.

The deep green to medium green foliage is typically a lighter color, sometimes whitish, on the underside. As Winter approaches, the leaves turn reddish.

Very floriferous, cranberries have axillary blossoms that emerge on flowering branches that are taller than the other stems. A cranberry bog in full bloom is a sight to behold and has been described as "a pink cloud." Depending on location, the solitary, nodding flowers appear from May to July.

The blooms are pink with either white or red tinges. These feature petals with edges that curl downward, a four-clefted corolla, and conspicuous, beak-like stamens.

Borne on six-inch-long, upright, erect stalks, the long-lasting fruits can vary slightly in shape. They're ½ to ¾ inch wide. The undersides not exposed to the sun can be white rather than red. They ripen from September into November. These familiar, small, acid tasting berries have been praised highly for their healthful qualities.

Cranberries typically begin yielding their first crops of fruits during the first or second year after planting. In large bogs, the berries are traditionally harvested with a harvest rake. A plastic, hand-held rake that can also be used for harvesting lowbush blueberries and lingonberries is available from various fruit plant catalogs.

Growing Cranberries

Several cultivars of cranberries are available to beekeepers and homesteaders. These include

Stevens, which is very fruitful and bears particularly large berries. Pilgrim, which also produces large berry crops, is six inches tall and bears wide spreading branches.

Cranberries are grown commercially in Massachusetts, New Jersey, Wisconsin, Washington, and Oregon. The growing information here deals only with recommendations for bee gardens and homesteads rather than for commercial bogs. Keep in mind that a bog is unnecessary provided one's garden soil is kept moist.

Suited to sun and light shade, these plants require a moist, acid soil with a pH of 4.5 to 5. They do well in wetlands and other wet or flooded soils. Peat and sand are ideal as are rich soils high in organic matter.

Michael A. Dirr, a renowned woody plant specialist and author, has written about growing these plants successfully using a mix of one-half sphagnum peat and one-half garden soil. Cranberries do require watering during dry periods because these happen to be a shallow rooted species.

Space the plants one foot apart in rows that are two feet apart. Keep the bed mulched to protect the roots from heat and drought. Because cranberries are hard to propagate from cuttings, it is generally best to buy container plants.

Generally home gardeners find the plants to be relatively pest and disease free. However, the same isn't true for commercial cranberry bogs.

Bee Value of Cranberry Plants

Cranberries are considered major bee plants in the West, Northeast, and North Central regions. Bees gather nectar and pollen from these blossoms. The amount of nectar does vary slightly by conditions, and can be adversely affected by wind, rain, and cold.

The blooming period typically lasts for three to four weeks or so. Assuming the plants are plentiful, beekeepers can harvest a surplus crop of high quality, reddish honey with a pleasant, berry-like flavor free of acidity.

The Role of Bees in Cranberry Pollination

Strictly speaking, cranberries are said to be self-fertile. Yet, the fact remains that cranberry growers benefit greatly when bees provide pollination. Study after study since the 1960's have shown that pollinated plants produce many more fruits.

While a typical unpollinated plant bears about fifteen fruits, the pollinated ones can yield up to 150. In addition, the pollinated ones yield larger berries that mature and ripen more evenly, and larger crops overall than the unpollinated ones. Various pollination studies confirming the benefits of bee pollination have appeared in *Bee Culture* over the years.

Cranberries are dependent on bee pollination largely because in most areas native pollinators, such as bumblebees, have experienced declining populations. This is particularly the case for bumblebees, which began their decline in the 1960s, reports S.E. McGregor in "Insect Pollination of Cultivated Crop Plants," USDA Agriculture Handbook No. 496.

A general recommendation is to use one colony for each two to three acres of cranberries. When native pollinators are absent, this should be increased to one hive per acre. Generally, cranberry growers are using one strong hive per acre. BC

Connie Krochmal is a beekeeper, writer and plant expert living in Black Mountain, North Carolina.

Ann Harman

Worker Bee Extraordinaire

Dewey **Caron**

A bee colony has to have many worker bees to get all the tasks done. So too does an organization, as does a bee journal like *Bee Culture*. Ann Harman is the archetypical 'worker bee,' best described as the 'energizer bee.'

Ann has been a tireless worker on behalf of the Eastern Apiculture Society along with Virginia and Maryland bee groups. She is a Master Beekeeper, getting certified in the very first group to earn the EAS MB certificate (1981 at Rutgers). The same year she gave an EAS workshop on Honey cookery. One year earlier Ann gave her first talk to EAS (UVM, 1980) on studies testing bee venom on arthritic dog and horses, after bees, her other favorite animals.

In 1982 Ann was again on the EAS Short Course and conference programs. She also began to help proctor, then grade, the EAS MB Exam. In addition she was a Honey Show judge. During subsequent conferences, her presentations varied from topics as diverse as batik, chemistry of honey, honey cookery, judging honey quality and apitherapy. She has also continued her honey show judging and once again this year at the EAS meeting at the University of Delaware July 31-August 4, she will be assisting and exam grading for the EAS MB examinations.

Ann dates her beekeeping to 1978. We sent her on a "swarm" call from the University of Maryland and told her to keep it – it was hers. She attended her first short course that year at the University of Maryland; later she was part of the instruction. At that time she was Head of Science Department, Georgetown Day School in Washington, DC. Her science specialty was Chemistry and before teaching was a Research Physical Chemist, National Institute for Science & Technology in Gaithersburg, Maryland. She would eventually be assistant research apiculturist for me and then as our honey bee Extension Specialist in Maryland.

> "Ann Harman has been there and done that!"

In 1987 Ann was elected as EAS Director from Maryland. The next year she took on the EAS Board liaison to the Awards Committee – continuing in that function for 15 years. She was on our Awards selection committee and when EAS added the Divelbiss award in 1988, Ann took on the annual task of finding and evaluating candidates for the Divelbiss award. We had the chance to surprise Ann with the award in 2010.

Ann was President of the 1990 EAS Conference in Salisbury, Maryland. In 1996 she was Vice-President of the EAS meeting at James Madison University in Harrisonburg, VA. She has been both Maryland Association Vice-President and honey show chairman and Treasurer, VP and President of the VA State beekeepers.

As Maryland EAS Director, Ann had taken on the task of standardizing the EAS Honey Show and judging criteria (each state was responsible for the EAS honey show so rules sometimes varied from one year to the next to the consternation of entrants). In this role, she wrote virtually every state that had a honey show to obtain and compare their show rules and judging score system. She became EAS Honey Show Chairman the following year (1991), continuing over 10 subsequent shows in that role.

At about the same time she helped ABF rewrite their show rules and judging criteria. She was an ABF Honey Show judge for several years and an alternative to the National Honey Board (2004-2008). Over the years she has judged numerous honey shows in New Jersey, Delaware, and Pennsylvania and has continued as judge for many of the annual EAS honey shows. She is a Welsh Certified Honey Judge.

In 1992 I asked Ann to become vice-chair to the EAS, a new position created that year. Ann filled the Vice-Chair with excellence. While away on sabbatical in Panama (1995 Ohio meeting), she was the acting Board chair. She would continue as Vice Board chair until 2008, serving three different Board Chairmen.

In addition to EAS, Ann is a well-known and popular presenter on the "bee lecture" circuit. She gives over two dozen bee talks annually to her home club and other VA clubs, plus numerous programs in nearby state and local clubs. She is often on regional and national bee meeting agendas. She teaches a local bee school and is a mentor of one or more 'newbees' each year (her neighboring farmer is a current mentee). She has been newsletter editor for her local association, the North Piedmont beekeepers, for 20 years.

As author of a monthly *Bee Culture* column, Ann is a well-recognized voice of beekeeping. Her first *Bee Culture* article was in May 1980 (twine suitability as smoker fuel). When Kim Flottum became editor she became a monthly columnist (honey cookery). Although she will occasionally still write about this topic, her columns now cover a wide range of topics. She is a very careful proofreader and has assisted with many of the popular bee books such as *Beekeepers Handbook*, my *Honey Bee Biology and Beekeeping* and as Co-editor of *ABC & XYZ of Beekeeping*.

Ann is a frequent overseas traveler. Her record is five continents, 29 countries with 54 total assignments. She has represented Agricultural Cooperative Development, International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA), Partners of the Americas (PoA), Farmer to Farmer (FTF), and Citizens Network for Foreign Affairs (CNFA), Land O'Lakes International, Citizens Democracy Corp, and Winrock International.

In addition to *Bee Culture*, she is frequent contributor to Beekeepers Quarterly and *Bee Craft* (both from England) and with me was co-editor of digital *Bee Craft America* (no longer offered).

We are blessed to have such an energetic worker bee for EAS and local and regional bee groups. As the saying goes, **Ann Harman has been there and done that.** Be sure to come up to Ann and greet her at EAS 2017 in Delaware July 31-August 4. She will be at the *Bee Craft* vendor booth, giving MB exams or look for her in the honey show area. BC

Ann Harman and Dewey Caron are both great friends to Bee Culture. *We'll all be at EAS this year in Delaware. Hope to see a bunch of you there.*

BIGGER PICTURE

Jessica **Louque**

Swarm Shaming

I don't know how everyone else's Spring season went with their bees, but we had an insane amount of swarms this year. Sometimes, we managed to catch up to 10 in a week! They have all been fairly photogenic or willing participants in videos (I suppose they were willing but I didn't stop them to ask). We've had a lot of unusual occurrences going on in NC, and maybe some of these things have been happening in other areas as well.

Last year was one of our highest *Varroa* counts on record in our apiaries. They were totally out of control. We went through multiple rounds of treatments just to finally get the counts down to manageable levels just before overwintering started. This was in part due to the earlier Fall treatment starting around the same time as a late year heat wave, killing off most of the open brood in the colonies. Treating with miticides is much more effective when you kill the bees and the mites, I guess. Sarcasm aside, murdering a round of brood did provide some additional relief to the situation since the mite cycle lost a food source and it allowed the population to drop down faster than with treatment alone. The major downside here was that we were starting with the Winter bees and it hit most of the colonies pretty hard for a few weeks before they recovered in numbers.

Once we made it through to Spring, we had about 80% survival across the board on average. It looks like we had a higher survival of mites though, as the populations started to explode in the early spring, along with the colonies. We were on the verge of treating in early Spring (something I don't like to do because it interferes with the first honey flows) when the swarming season started. We had some colonies that were triple deeps before the end of February, and it still wasn't enough room. Our temperature swings went from the high 70s to the low 20s sometimes in a span of less than a week. Then we had a drought in March, followed by an onslaught of rain that started in April and didn't let up for a long time. One round gave us between five to eight inches of rain (depending on the site) over the course of four days, then another round brought in colder temperatures after being solidly in the 70-80° range, causing the colonies to start crashing. The rains may have helped the nectar flow in some cases, but it rained more than it didn't during the tulip poplar flow. It doesn't really matter how much nectar is available if the bees can't fly.

We started really having swarm issues in March. We had a pretty nice week in early March to check the bees, and there were obvious signs that swarming had already started. There were queenless hives everywhere, full of swarm cells, with young larvae still present. I have the most amazing videos of swarms emerging from their cells, new queens piping on their first day on the job, and even one of a new queen with murder on her mind ripping open another queen's cell with the help of the workers, only to yank her out, battle her across the top bars, and then throw her out of the hive and march around victorious like a WWE wrestler on Smackdown. Sometimes, we would open up a hive and it would instigate swarming. It was a real challenge just to keep the colonies under control. We tried to follow them when we saw them leave, only to have the swarm drift ever so slowly right across the highway over a neighbor's house. Sometimes, they would go straight up about 50 feet in the treeline and mock us. I will say that this year has made me a true believer in Swarm Commander though. That stuff is amazing.

I first heard about it from Don Hopkins, who saw it in action at an EAS meeting a few years ago. It was sprayed on a tree, and within 15 minutes it had attracted a swarm from what seemed to be one of the teaching hives at the meeting. I bought some spray and a squishy long-lasting lure at Dadant, not really thinking it was going to be all that great but maybe would help some. Boy was I wrong. Once, I literally chased a swarm with a nuc that had Swarm Commander in it, yelling at them to get in the box. Then, the craziest thing happened: they did! I sat the box down though. It also made a nice video, after the yelling stopped (I didn't want to sound crazy, duh). I started setting up the swarm lures, and had mixed success depending on usage ideas. I think a lot of the failures were user error, but a few times I did have a weird turn of events.

Once, we had a swarm land on a guidewire from a telephone pole. I sprayed Swarm Commander in the box and put it on top of the edge of the swarm. The swarm started crawling up into the box, and five minutes later, they exited in mass-exodus style into a nearby tree. After leaving them alone for a half hour, we were able to successfully knock them

Bobby catching a swarm.

Swarm landing in a nuc box with Swarm Commander inside.

Swarm attracted to Swarm Commander long-lasting lure.

back into the box, where they are still happily contained. I'm not sure what happened there initially, other than perhaps the spray was too strong?

Another time, I learned that Swarm Commander spray will remove paint from equipment fairly easily, and it will trap bees in the melting paint. On other instances, we realized that sometimes it works too well, and we attract bees away from functional hives and have a box full of bees with no queen. Other times, I think we may have caught swarms that otherwise wouldn't have left, or became super colonies from the swarm plus other foragers from nearby hives. Overall, I have been pretty excited with my success with Swarm Commander. I've tried it side-by-side with "standard" lures and I've bees go right past those and straight into a Swarm Commander baited box. Although laziness sometimes trumps common sense, I have seen that lures used in boxes higher than the current hive catch swarms the best, especially if they are within maybe 50 feet of the apiary. If they're more than 100 feet away, I don't have a lot of luck. In a strange couple episodes, I found that it works best if it's not already in the apiary, but if you happen to be in the right place at the right time and put the lure out just as they start to swarm.

Another odd thing I saw this year was that a lot of the swarms seemed to leave with no real direction. I was able to chase down a handful of swarms with lures, simply because they didn't seem to know where they were going. One swarm just hung in the air for about 15 minutes swinging back and forth between a tree and a pole before finally settling on a low-hanging branch. The queen probably was tired of flying at that point and landed on whatever was closest to her. One swarm flew out of the hive, collected themselves for maybe five minutes of unsurety, and proceeded to land on literally everything in front of their old hive. Our fruit trees, blooming flowers, grass, weeds, other hives – it was really weird. I put a nuc down in the middle of their bee blanket with a SC lure and they decided it was a better place than where they were, and after about 10 minutes they were all safely rehomed with the queen in tow.

I don't know if this is just with the swarm lure because I've never really paid attention, but I saw something by accident this year and it seems to work really well in some cases. I caught a swarm with a lure, but there were so many bees going in through the top and bottom that I didn't really want to close it off. I put a bottom board upside down on the top for them to use, and ended up leaving it because it was the most popular entrance by far for the ladies. The hive has grown incredibly fast, and I'm not sure if it has to do with having multiple entrances, but I've tried it on a couple other swarms and they seem to "enjoy" the top entrance as well. The problem is that I can't use a hive-top feeder with a bottom board because they have to be accessible only from the inside. It was worth it to not use a feeder at all on some of those swarms just from the increased activity and growth of using a top entrance. These are a total pain to move or deal with because you are opening the hive at the entrance and it's harder to close off for transport, which is why I haven't done it before. I might definitely consider using a normal lid during transport and switching out to a bottom board in the future. It may be an issue with robbing or queen laying, but I want to see how it does with honey supers. It's a little slower going with honey if the foragers have to go through a queen excluder to fill in a super, but I don't know if the top entrance would encourage robbing. That is a project for this year's "questionable ideas" list.

If you were contemplating the use of Swarm Commander, I would definitely recommend trying it during your next swarm season. The squishy long-lasting lures kept selling out at Dadant, so maybe those would be a good stocking stuffer to save in the freezer until Spring? Just a suggestion! BC

Newly emerged queen.

DOWNTOWN

Easy Urban Crime Reduction

At this month's club meeting, we handed out 6" by 16" rectangles of eight-to-the-inch hardware cloth to any member who wanted one, and offered a short demo on how to turn it into the world's simplest robbing screen. Our club paid for the hardware cloth (and sacrificed about 10 minutes of keynote speaker time) to do this. But it was worth it to us: robbing screens could potentially help in the selection of better urban bees, if you squint a little and look to the side, perhaps.

For background, a robbing screen is a device that attempts to separate the flight of robbing bees from colony residents. Using a mesh too fine for bees to pass through, the beekeeper makes a screen that allows the smell of hive resources to attract robbers to the front of a hive, while providing reduced, indirect entry to residents which instead follow the pheromone trails of fellow colony members in and out of the hive. I usually pair such a screen with a reduced entrance to make colonies more easily defended.

Sometimes, the comparisons between colonies of bees and communities of people are irresistible, though not always helpfully so. My story of urban beekeeping over the past 12 years sounds a bit like urbanization itself: you start off kind of on your own, exploiting lots of resources and with little exposure to the consequences of others' experiences and actions. Flash forward a decade or more, and you are sharing habitat with hundreds of others, swapping individual organic material with gusto, and facing a higher risk of home invasion.

Apiary Hygiene!

Yes, my friends, this article is about how the very well known, just about universal phenomenon of robbing is somehow different in the city. If you want to skip to the pictures, here's the heart of it:

- robbing is becoming part of the urban beekeeping furniture with densely packed colonies and wide differences in strength;
- it creates another obstacle to colony survival, one which is not necessarily linked to the quality of the winner's genes; and
- it may not be hard to slow robbing down, if not stop it, in your own city apiary.

So why discuss robbing now? On March 8, Dr. Dewey Caron gave a terrific talk to the Northern Virginia Beekeepers Association that both inspired, and (as usual) kind of terrified me. Dr. Caron had much more to share than what I am misinterpreting here, but his words on sustainable beekeeping and breeding from survivors as a critical tool seemed like a hard prescription for urban beekeeping. It is clearly the only way that evolution and hybridization–the quest for the perfect bee–can work. Where I keep bees, however, the reasons your bees have died can range from standard issue beekeeper error to bad weather to mosquito spraying to having pseudo-beekeeper neighbors (among others). Therefore, even though I would like to believe that the survivors from which we might breed have thrived due to an internal quality that might also help others pull through, it might just be because they were spared living next to the Typhoid Mary of unmaintained downtown colonies.

Like anywhere else, city beekeepers can have bees die because they really should have: for instance, they were bred for Nebraska or Florida winters and you live in New Jersey; the queen was a bum (come on, she has *one* job, you know?); they were left to swarm over and over; *Varroa* mite levels spiked unaddressed, and so on. There are steps any of us could have taken in these cases: purchase or breed local queens, monitor colonies more closely when a new queen is introduced, have and execute a detailed IPM regimen, regularly test and (if necessary) treat for mites.

There are hive losses that just shouldn't happen, however, if it is just about the quality of the genes. Bees killed by pesticides, unpredictable forage due to climate shifts, bees crossing paths and passing pathogens new and old more frequently, *Varroa* bombs rolling like waves across neighborhoods. In this town, we are starting to see a related harsh inevitability by midsummer: robbing creates and exacerbates hive losses, unrelated and unstopped by beneficial genetics that give us cool things like mite resistance, adaptation to local climate, wintering, and productivity. In other words, you

could be breeding wonderful survivor bees, and lose them without knowing you had them, if robbing peaks across your neighborhood and blows through your yard.

The reason we hand out robbing screen materials in May is that robbing is a given for us in August. We always have dearth soon after our one and only big nectar flow. At that point, our colonies are at peak population, and then nature slams on the brakes. Beekeepers must do something about it, or lose at least some bees (and possibly create a public hazard).

Among my colonies, the Carniolan hybrids seem to look around during dearth, say "Winter is coming!" then start rolling back the brood rearing. They are clued-in to seasonal shifts. For my Italians, however, the party never stops. They want babies, they want them now and always, and they need that stuff that they smell in that super *pronto.* When my Carnies make the seasonally adapted shift to smaller colony size, they become vulnerable to genetics that come from a sunny ancestry where winter didn't really come, or come for long.

In this case, I can have a colony of bees that are poorly adapted for my winters rob out a colony that has a much bigger clue. This is not a genetic step forward. Also, all that crazy brood rearing is like a hothouse for varroa mites. So robbing gives advantage to the wintering genes I would not choose, and passes around the greatest threat my bees face.

It's not that the Italians do not have traits I want to keep: I love the gentleness, the productivity, the reluctance to swarm (compared to Carnies). What if I just made it harder for my bees to rob each other? What if my neighbors did that, too? What if we made it easier to keep the good stuff, hold off the bad, and end up with a much better idea of what killed the colonies that died and confidence that the ones from which we breed deserve to be carrying the torch forward?

Since robbing can get exponential once it starts, wouldn't even small barriers and delays help? Here's one way to make cheap and easy robbing screens. They are not as failsafe as some of the store bought or more complex ones, but will probably help robbing *not* start as easily or as soon. Screens for most other hives can be cut down from the measurements below.

To make a simple robbing screen for a 10-frame Langstroth hive

This is not beautiful or guaranteed to prevent robbing, but it is cheap and quick. This asks for #8 hardware cloth, but you can use metal window screening. One British beekeeper worried about the sharp edges demonstrated how to wrap the edges in tape for their protection (see final photo).

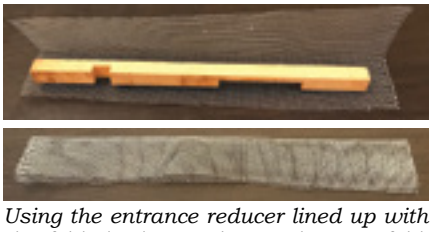
Determine whether your bottom board has one of the two profiles:

A. Side bars that extend to the end of the landing board; or

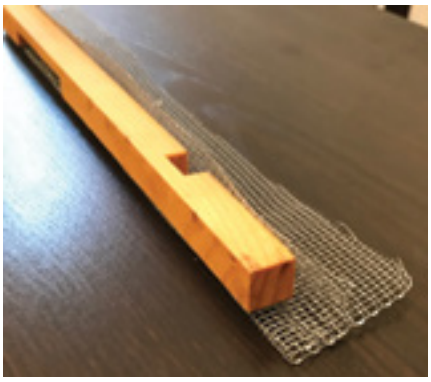
B. Side bars that end flush to the face of the hive body with the landing board extending forward

Using good quality tin snips, cut a roughly 16" by 6" rectangle of #8 (8 squares to the inch) hardware cloth – more info at the always wonderful HoneyBeeSuite. ***https://honeybeesuite.com/what-size-hardware-cloth-is-best-for-beehives/***

If you have a wooden entrance reducer, you can use it during the following steps to help fold straight lines and determine passage size.



Using the entrance reducer lined up with the folded edge, make another 90° fold. The entrance reducer ensures that you are leaving enough space for bees to pass through.



Fold flap all the way down.

After this, there are two alternatives.

Bottom Board A Instructions:

If your bottom board has arms that extend to the edge of the landing board (A), fold the other side over the fold you just made. Then spread it out.

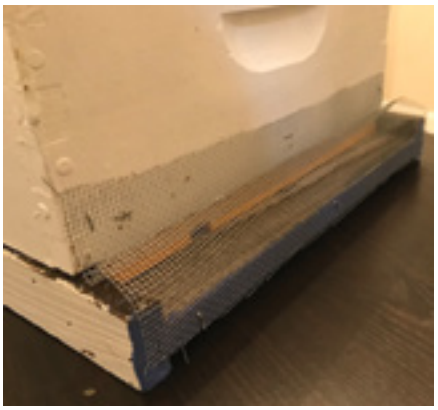
I call this the P fold.

To install:

Place the entrance reducer first: I use the larger opening if no robbing has occurred yet, the smaller opening if there have been reports.

Have either a staple gun or tacks available to secure the screen.

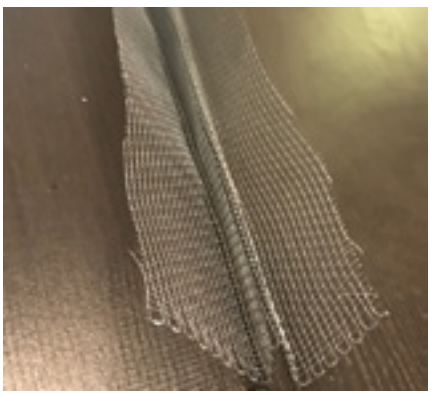
The "P" basically goes in upside down. The leg of the P will be flat on the face of the bottom box. The next fold will make a tent over the side bars, the final fold will go over the front of the bottom board. Place a staple or a tack in the center and at both ends of both the top and bottom of the screen.



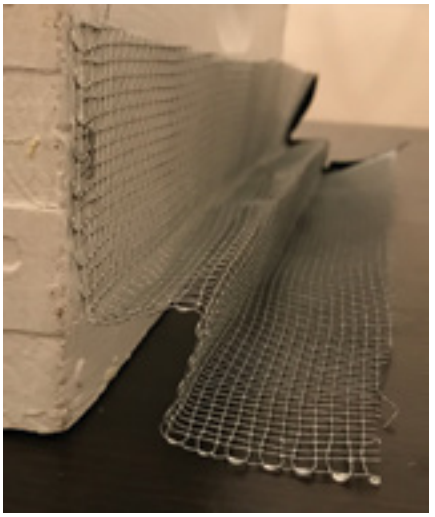
Bottom Board B Instructions:

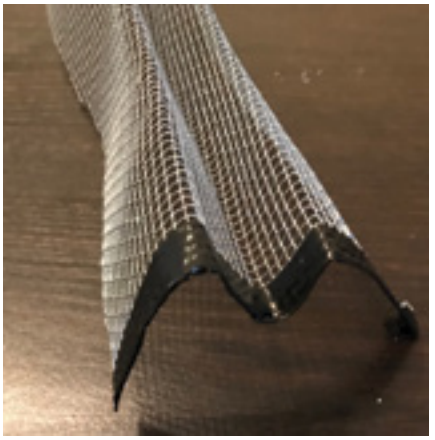
If your bottom board arms that support the boxes end at the front of the box (B), flip the hardware cloth which has been folded in half and then folded again over. Fold the second side to match the first.

I call this the W fold.



Spread this out some, then align one of the bottoms of the V to the edge above the entrance reducer, and attach with either staples or tacks. Extend the other V-fold so that the middle fold makes a right angle. Attach the remaining flap of hardware cloth to the landing board.





BC

The Solution To The Bee Problem?

David **Donnelly**

The media has been all abuzz about a solution to a problem that is near and dear to us beekeepers. NBC News titled their online article *Scientists Have Some Wild Ideas for Solving Our Big Bee Problem,* referring to colony loss. You may think they are talking about a solution to pesticides. Or *Varroa* mites. Or habitat loss. Or the climate change crisis. Or even the loss of pollinators in general, including monarch butterflies. No, it's nothing as simple as that. Their solution is drones!

No not those drones, not the ones whose sole purpose in life is to deflower a young virgin of royal blood. Not the drones that would spend the rest of their time drinking beer and watching football, if only they could. It's the other kind of drones. You know, like the remote-controlled airplanes, big and small, that fly around without pilots. But these drones are smaller than the ones that drop bombs, even smaller than the ones that teenagers fly around looking for sunbathing neighbors. The drones we are talking about here are about the size of butterflies.

Eijiro Myiako, along with his colleagues at Japan's National Institute of Advanced Industrial Science and Technology, has invented a very tiny *mechanical* drone (as opposed to a drone *bee*). Its job is to fly around flowering plants, huffing and puffing, spreading pollen around. *What?!* Hey, I didn't make this up. If their purpose is to pollinate, does that make them worker bee wannabees?

Now never mind the practicality of this on a large scale among the thousands of almond trees in California alone. The very thought of drones being the ones that do the pollinating instead of workers kind of turns my brain inside out. In my way of thinking, the only way to envision drones taking over the pollinating role of the workers would be if some of them have gender identity issues. Not that there's anything wrong with that. Are you following me so far?

Now I'm not one to scoff at technological wizardry. New science may ultimately save the planet. But as a pollinating "solution to the bee problem," this mechanical solution sounds pretty farfetched. Did anyone ever tell these guys that it takes zillions of bees to pollinate all the crops that need it? And what about all the plants that are not income generators? Maybe a new department of the federal government could be started to buy mechanical drones and train remote pilots to pollinate all the flowering trees, wild flowers, and weeds, once all the bees are gone. This could generate a whole new cottage industry for drone pilots, grant writers, and drone wranglers.

Now if you are one of those head-scratchers who question the whole idea of mechanical drone pollinators, just consider this. Back in the day, the nay-sayers probably told Edison and Ford that their ideas were cockamamie, too. The nay-sayers were ultimately proven wrong. Nevertheless, count me among the head-scratchers. But the technical impracticality of pollinating just the farms, ranches, orchards, fields, and gardens of America alone is not my argument with the claim that this will "solve the bee problem."

It's like saying, "No problem if all the honey bees in the world are wiped out, almond growers, cause we've got you covered!" What audacity! Honey bees are one of nature's most perfect creatures, who perform miracles every day, working tirelessly to collect pollen and make honey of untold value. And when they aren't working, they wax prosaic (yuck). Whole businesses and hobbies are built around the beekeeping industry. After all, they give retired federal workers a new lease on life speaking at bee

schools. And they give kids great fodder for school posters.

But even that is not my argument with this sci-fi "solution to the bee problem." It's not like I run around picketing to save every spotted owl or tree frog that's endangered. And it's not just because I enjoy the hours that hobbyists like me spend building hive bodies, pointing out larvae to the neighbor kids, or listening to people coming up to me at crafts shows saying, "Are the bees dying?"

To feel the breeze on a Spring morning with bees and other pollinators flying around trees bursting with pink or white flowers is to feel the essence of nature. Do the worker bees feel the same magic when they are foraging, or do they just think of it as going about their day job? And what would they think about being downsized or replaced with robots? If we think our world will be just as rich with no bees but plenty of mechanical pollen gatherers, what does that say about us? If we humans disappeared or stopped performing, would mechanical drone-people fill the void? Maybe bees aren't here for us, maybe we're here for them.

It's difficult for me to wax prosaic when I don't have wax glands. So I'll just spit it out: honey bees are cool. They are the jazz musicians of the animal kingdom. I like the fact that their very being brings joy and pleasure to gardeners and beeks like me. They even bring peace to countless people, from wounded warriors and incarcerated felons. My wife and I had a day for the neighbor kids to come over and see the bees, who thought dressing up in their borrowed bee garb was half the fun. One little four-year old boy asked if he could kiss a bee. He wouldn't have asked if he could kiss a mechanical drone. Without exception, they were all fascinated and had a story to tell their friends and parents.

No doubt amazing scientific achievement and creative imagination went into creating flying mechanical drones to "solve the bee problem." But they will never replace the smile on the face of a child who sees a real bee carrying pollen into her hive. Nor will they replace the contortions I undergo when I lie on the grass trying to take an extreme close up of a worker bee on a dandelion. BC

PORTER BEE ESCAPE

Jim **Thompson**

Methods of Removing Honey From The Hive

Perhaps the oldest and quickest method in removing honey from a hive is the brush method where a beekeeper opens the hive and brushes or shakes the bees off of a frame and puts the frame into an enclosed super or box that keeps the bees off of the frame. It is a good method as the frame or frames get inspected to see that they are full of honey and fully capped. Frames that contain brood, open cells of honey or have no honey are left on the hive for the beekeeper to make a decision on their future at a later time.

An entire honey super can be removed from the hive by banging the super on the upturned hive cover. The bees are dislodged and the super can be put in an area where robbing bees will not bother it. This super could have areas of brood, high moisture honey and cells of various stages of filling unless you did the required manipulations before this day. An advantage of this method is that only one trip to the beeyard is used. Other one trip methods of removing honey supers from a hive are by using fume boards and chemicals such as Bee Go, Honey Robber, or Bee Quick. Some of these chemicals have an unpleasant odor and so you must be careful to not get the chemical on your clothes. However if you have a perverted sense of humor, you could take the fume boards to a shopping mall and leave the fume boards in the back of your truck and watch people experience their encounter with benzaldehyde. A couple of these chemicals work better if the temperature is warmer or heat is applied. The use of a bee blower is used by some beekeepers to remove bees from the supers. Some will mention that this is hard on the bees as they may suffer physical damage when they are blown out of the supers. Some beekeepers have used smoke to drive the bees out of the honey supers. Although this is a quick method, it is not one of the preferred methods as the departing bees chew holes in the cappings and the smoke odor can be absorbed by the honey.

The two trip methods of removing honey supers are easier on the bees, but require more time for the beekeeper as there may be rearranging of frames and supers, and that second trip.

The Porter bee escape was first used in the 1890s and was a single ended metal device that would allow bees to go only in one direction. The escape was placed in an oblong hole and had a hole that was approximately 7/8" in diameter on top. The bees would go through the hole and then through a pair of metal springs and find themselves in the super below. A model of this Porter bee escape that had metal projections for fastening it to a honey house wall was also available. In 1915, these two Porter bee escapes were available plus a new double ended Porter bee escape. By 1922, the single ended Porter bee escape was phased out of the Root line and two bee escape boards became available. The metal double ended Porter bee escape continued to be sold until 1983 when it was changed into a plastic model.

The bee escape boards of 1922 were an inner cover fitted with a Porter bee escape while the other one, Hodgson Ventilated Bee Escape board, had a center board that went sideways or across the board and a screen field. The escape board with the fitted Porter bee escape was sold until 1949. The ventilated escape board was discontinued in 1925, only to be brought back in 1988 as a ventilated escape board/moving screen. In 1991 it was discontinued again.

From 1967 to 1981, the Root Company sold a new ventilated escape board that many beekeepers refer to as the "down and out board." This board had three piece side rails that would hold the screen wire and two Porter bee escapes in opposite corners. Bees could go down through the bee escapes into the super below or out to the outside of the hive through gaps in the three piece rim.

Many beekeepers made bee escape boards that held up to six Porter bee escapes. The beekeepers that had years of experience using Porter bee escapes had several rituals that made the escapes work well for them. First they would soak the bee escapes in alcohol each fall after using the escapes, to clean off the propolis and beeswax, making the escapes appear and work as brand new. Many beekeepers do not know that the bee escapes slide apart and the springs inside must be adjusted to the width of a bee or a regular sized wood pencil. If the gap between the springs is too small, the bees will not be able to get through the springs and if the gap between the springs is larger than the bees, the bees can go either direction through the escape. The frames in the honey supers must be checked for brood and uncapped honey and those frames moved physically to a part of the hive that is not going to be affected by the removal of the honey frames. Bees will not leave developing and hatching brood, so it may appear that there are more bees in the honey supers. To make the bee escapes work even better, two or three small holes of about 1/8" in diameter can

Single ended Porter Bee Escape

Porter Bee Escape for Honey House

Double ended Porter Bee Escape

be drilled through the metal at the bottom of the escape in the 7/8" entrance hole area. You might call them communication holes. Some beekeepers liked to staple or screw the escape to the inner cover because they said that the escapes fell out, but in fastening the escape, another board could be used upside down to let bees get out above the honey super and two escape boards could be used. All holes or gaps in the super that lead to the outside must be sealed or you may have an entrance into the super that you are wanting to remove and the bees can remove the honey out of that super in the 24 hours. If the Porter bee escapes are used properly, the bees will often be out of the super in 24 hours however some beekeepers allow up to three days. I would not wait longer than that because of the beetle situation. A few beekeepers have mentioned that small wedges outside of the springs should be inserted in the escape to keep the bees from clogging up the escape. I feel that this is unnecessary if you are using the bee escape properly, it won't be on the hive long enough to cause you problems.

For years beekeepers have known that a funnel made of screen could be used as a one way device. Small funnels were used in the queen and drone traps while larger ones could be used on buildings where bees had inhabited. The small end of the funnel is slightly larger than a drone. When the funnel is put on a building, the length of the funnel is important as the bees will tend to seek the former entrance at the base of the funnel and will seldom go out to the small end if it is 8" to a foot away.

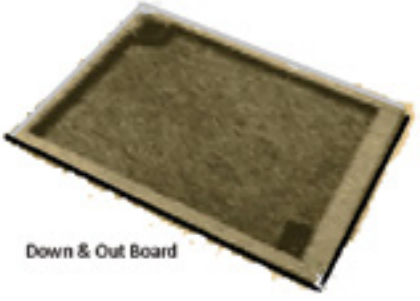
In 1983 the Vladimir Shaparew invented a conical bee escape board that used 10 plastic cones. The cones were mounted on a board that went across the hive and had a wide channel in it. Vladimir's original idea was to use 1/8" hardware cloth on the field of the escape board, but when the bee supply companies started making the boards, peg board was used. The peg board models work okay but the screen models work so much better. The escape board is placed under a super that is going to be removed and the beekeeper should check the super to make sure that there is no sealed brood or unfinished frames. The bees normally will be out of the super in six hours, but you can allow more time to make it convenient for you. If you forget and leave the escape board on the hive for a week, the bees will build burr comb on top of the frames and start using the small end of the cones as entrances to the super that you are planning to remove. I like the screened escape boards because of the good view of the displaced bees that have been removed from the super. It indicates how hard the board should be banged or smoked to make the bees move down into the hive so the escape board can be removed. Peg board models hide much of this view of the bees. With the screened model, one can insert a plug in the groove or duck tape the groove shut and use the escape board as a moving screen. There are perforated cones available which may make a conical bee escape board work even faster when put on a peg board model. If you plan to make any of these boards, drill the holes for the cones in the center board from both directions before you cut the groove. The wood will not splinter as badly.

The triangular Canadian bee escape board and the many variations is another very good escape board. There are no moving parts and the board can be used upside down. The one sold by many dealers is the double triangle board, but there have been four sided models and boards with additional blocks to form mazes. The bees go through a hole in an "Inner cover" and find themselves on a communications screen. When they are walking, the boards guide them to an exit, which is just big enough for a bee to go through. Bees on the other side of the escape board have a difficult time finding the exit/entrance as it is above their heads when they are standing on the frame top bars. The exit is disguised as much as possible and most of the bees will be drawn to the center to do their communications with bees in the top super. If a bee manages to get into the escape board through the exit, the additional boards inside of outer shape do a good job of guiding the "intruder" out at the exit. Again these boards work fast to get bees out of the supers and some say that six hours is enough. One report that I read mentioned that most of the bees were out in 15 to 20 minutes, but I have a hard time believing that. The larger screen area makes it difficult

Plastic Bee Escape

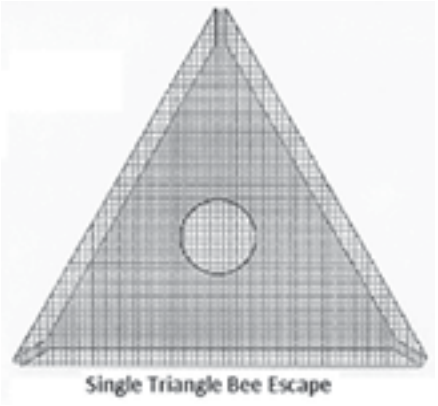
Bee Escape with Board

Hodgson Ventilated Bee Escape Board

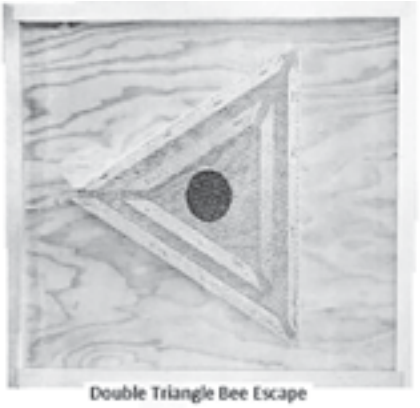


Down & Out Board

Conical Bee Escape Board



Single Triangle Bee Escape



Double Triangle Bee Escape

Vortex Bee Escape Board

for the bees to find the exit points because of the distance. However, again, if these escape boards are left on too long the bees will find the exits. I like to imagine what the bees would experience if they had their own GPS system telling them to turn right or left. When they reached the exit and found themselves on the top bars of the frames, they might hear their GPS telling them, "You have reached your destination."

There are other bee escapes on the market and when you analyze them, most of them are incorporating the same principles. So I thought that I would just mention them and show a picture or drawing of some of them. The real test is to find the type of bee escape that fits your style of beekeeping.

The eight way or five way bee escape are similar except for the number of exits. I have an eight way bee escape pictured sitting on a piece of cardboard the size of an inner cover to give you an idea of what it would look like. The sides of the rim should be at least ¾" below the center board.

The Rhombus or polygon bee escape fastens to an inner cover with a center hole. The Rhombus has two escape ports and lots of communication holes.

The S shaped – two bee escape system has two entrance holes and two escape ports. It maximizes the use of 1/8 hardware cloth by using a narrow strip.

The Swiently bee escape board system also uses a board that usually holds two circular traps. The bees enter the trap on the other side above the communication holes and travel either left or right around the circle until they get to the exit holes. There is a plastic division between the exit holes.

The Porter Bee Escape was quite an invention after all it also had the funnel shaped when you consider the springs. Don't you wish someone had told you about the modifications that should have been done to make them more useful and efficient? BC

Jim Thompson is a long time beekeeper and bee equipment historian living in Smithville, OH and contributing regularly to Bee Culture.

Eight Way Bee Escape

Rhombus Bee Escape board

Turbo Bee Escape

Swienty Bee Escape

GLEANINGS

JULY 2017 • ALL THE NEWS THAT FITS

MANUKA HONEY BECOMES POLITICAL FOOTBALL

New Zealand's manuka honey industry is becoming a political football after the government's new testing system sees some of the best mānuka honey in the country fail to meet the standard.

The government released a proposed scientific definition of mānuka honey in April and while the Ministry for Primary Industries (MPI) is still receiving submissions on the proposal. producers have been testing their honey and are shocked by the results.

Independent industry adviser John Hill tells Radio New Zealand that producers had tested hundreds of samples of the best mānuka honey, worth up to NZ$300 a kilogram (US$96 a lb.), and about 20% had failed.

The opposition Labour Party, never backward in coming forward immediately called for the MPI to be split up, saying it is too big and is failing industries such as the lucrative manuka honey business.

Labor Party primary industries spokesman Damien O'Connor tells Fairfax Media the 2012 merger of the Ministry of Agriculture and Forestry, Ministry of Fisheries and the New Zealand Food Safety Authority is not working.

"In my view, it's simply too big an organization to have the expertise required in these very technical areas of food safety, of biosecurity, and other areas that are crucial to our economy," he says

Hill says the MPI needs to sort out the mānuka honey situation as quickly as possible.

"The standard's not being set... has actually unsettled the total industry." He says. "And packers aren't buying honey, beekeepers can't sell their honey, the overseas markets are jittery, and so it's turning into a very topsy-turvy time for the industry."

Manuka honey accounts for 80% of New Zealand's NZ$242 million (US$171.50) a year earned in honey exports.

MPI deputy director of general regulation and assurance Bryan Wilson tells the broadcaster there appears to be a problem with the laboratory testing methods used, and work is being done to fix it.

"It's the way in which the testing for DNA is undertaken," he says. "There is potentially some interference with some of the chemicals, so we're working on fixing that and we think we've got a solution."

Wilson says the test is designed to separate mānuka honey from other sorts of honey.

"We are pretty confident in the way we have got that set up," he says "We would expect a level of difference between what our tests show and what the industry's tests show. That's why we started this process in the first place."

Wilson says the ministry will retest those producers who failed on a case-by-case basis.

He says he's positive that any issues can be fixed at the end of the consultation process on June 13.

"Once we have gone through analyzing all of the results from that consultation and what we're doing now, then we will finalize our position," he says. "At that stage, there's still some time before the testing comes into force, so there's plenty of time still to get this right."

Alan Harman

BIONIC LEAF PRODUCES NATURAL CROP FERTILIZERS

In what could be the next agricultural revolution, American researchers have created a "bionic" leaf that uses bacteria, sunlight, water and air to make fertilizer in the soil where a crop is growing.

Harvard University researcher Daniel Nocera is building on the work he's most famous for – the artificial leaf – to make the fertilizer.

"When you have a large centralized process and a massive infrastructure, you can easily make and deliver fertilizer," Nocera says. "But if I said that now you've got to do it in a village in India onsite with dirty water – forget it. Poorer countries in the emerging world don't always have the resources to do this.

"We should be thinking of a distributed system because that's where it's really needed."

The artificial leaf is a device that, when exposed to sunlight, mimics a natural leaf by splitting water into hydrogen and oxygen.

This led to the development of a bionic leaf that pairs the water-splitting catalyst with the bacteria Ralstonia eutropha, which consumes hydrogen and takes carbon dioxide out of the air to make liquid fuel.

Nocera's team last year switched the device's nickel-molybdenum-zinc catalyst, which was poisonous to the microbes, with a bacteria-friendly alloy of cobalt and phosphorus. The new system provided biomass and liquid fuel yields that greatly exceeded that from natural photosynthesis.

"The fuels were just the first step," he says. "Getting to that point showed that you can have a renewable chemical synthesis platform. Now we are demonstrating the generality of it by having another type of bacteria take nitrogen out of the atmosphere to make fertilizer."

For this, Nocera's team has designed a system in which Xanthobacter bacteria fix hydrogen from the artificial leaf and carbon dioxide from the atmosphere to make a bioplastic that the bacteria store inside themselves as fuel.

"I can then put the bug in the soil because it has already used the sunlight to make the bioplastic," Nocera says. "Then the bug pulls nitrogen from the air and uses the bioplastic, which is basically stored hydrogen, to drive the fixation cycle to make ammonia for fertilizing crops."

Nocera's lab has analyzed the amount of ammonia the system produces.

But the real proof is in the radishes – the researchers have used their approach to grow five crop cycles. The vegetables receiving the bionic-leaf-derived fertilizer weigh 150 per cent more than the control crops.

The next step, Nocera says, is to boost throughput so that one day, farmers in India or sub-Saharan Africa can produce their own fertilizer.

Alan Harman

The radishes on the right were grown with the help of a bionic leaf that produces fertilizer with bacteria, sunlight, water and air. (Harvard University photo)

CALENDAR

♦INTERNATIONAL♦

Beekeeping Tour to Cuba November 11-19 featuring visits to apiaries, processing plants, research centers and more.

Contact Transeair Travel if your are interested in more details, 202.362.6100 or Blubic@TranseairTravel.com.

45th Apimondia International Congress will be held September 29 to October 4 in Istanbul, Turkey.

For more information visit **www.apimondia2017.org**.

♦CALIFORNIA♦

Western Apicultural Society (WAS) will held at the University of Davis September 5-8.

Dr. Norm Gary will be participating. Other speakers include Eric Mussen, Brian Johnson, Elina Niño, Serge Labesque.

Watch the web page for updates, details and registration, **www.westernapiculturalsociety.org**.

♦CONNECTICUT♦

Back Yard Beekeepers Association 2017 speaker schedule – September 26, Tom Seeley; October 31, Kirk Webster; November 14, Jennifer Berry.

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

♦DELAWARE♦

EAS 2017 - University of DE Newark, July 31 - August 4.

Speakers include Larry Connor, Kim Flottum, Mike Embrey, Maryann Frazier, Clarence Collison, Allen Hayes.

For information and to register visit **www.easternapiculture.org**.

♦FLORIDA♦

2017 South Florida Bee College, Davie, August 11-12. Offers training for beekeepers of all levels, gardeners, naturalists, county agents and anyone interested in bees.

For information and to register visit **https://www.eventbrite.com/e/2017-south-florida-bee-college-tickets-34422921886.**

♦GEORGIA♦

Georgia and Southeastern Beekeepers will will welcome Randy Oliver, October 6-7 in Griffin, GA for the Fall statewide meeting.

Other speakers include Jennifer Berry, Rusy Burlew, Keith Delaplane, Tammy Horn and Kerry Owen.

For details and registration visit **https://gbal17.wildapricot.org/event-2540629**.

♦INDIANA♦

Southern Indiana Honey Bee Field Day will be July 29 at Perry County 4-H Fairgrounds in Perry County.

Featured speakers include Phil Craft and Kathleen Prough. The cost is $15/person or $25/family by July 14.

For more information call 812.547.7084 or visit **www.perrycountybeekeepers.wordpress.com/**.

Heartland Apicultural Society will hold their annual conference July 13-15 at the University of Southern IN.

Speakers include Ernesto Guzman, Jeff Harris, Dan O'Hanlon and more.

For more information visit **www.heartlandbees.org** or email **www.heartland.apiculture@yahoo.com** or 317.432.9578.

♦IOWA♦

IA Honey Producers Association will hold their Summer meeting July 15 at Wickiuphill Learning Center, Cedar Rapids.

Speakers include Dale Hill and Andy Joseph. The cost is $35/members and $40/non-members.

For more information contact Eve Vanden Broek **mrstheo@iowatelecom.net** or 515.491.6760.

♦MISSOURI♦

Three Rivers Beekeepers will host Master Beekeeper David Burns July 22 for an Advanced Beekeeping Seminar.

The cost is $85/person, includes lunch. Bring your veil.

For more information contact Jerry Styczynski at 314.420.0264.

♦NEW YORK♦

Ny Bee Wellness Workshop - Disease & Management will be July 7-9 at Morrisville State College, Morrisville. Medhat Nasr is the featured instructor.

July 7, 7-9pm, presentation open to all, $20.

July 8, 9-5pm, lecture and demo, open to all, $50

Special 2-day session, July 8-9, field and lab session, 9-5pm, workshop limited to 24, participants must meet requirements and attend the Saturday session, $150. Add Friday evening for $20.

For more information and to register **www.eventbrite.com/e/ny-bee-wellness-workshop-honeybee-disease-management-tickets-33005508364** or contact Pat Bono, **workshop@nybeewellness.org**, 585.820.6619.

♦OHIO♦

The Ohio State University Bee Lab Webinars are held the third Wednesday of the month at 9:00 a.m. EST.

July 19: The Bees in Your Backyard – Olivia Messinger Carril.

To join a webinar follow the link and log in about 8:55 a.m. – http://go.osu.edu/theOSUbuzz.

♦WEST VIRGINIA♦

WV Beekeepers Association Fall Conference Celebrating their 100th anniversary, will be held September 22-23 at the Robert H. Mollohan Building at the High Tech Center in Fairmont.

Speakers include Alex Zomcheck, Joe Kovaleski and more. The cost for early registration is $35/members which includes Saturday lunch. After August 31 $45. Non-member early registration is $42 or $12.50 for Friday only.

For more information and to register contact **www.wvbeekeepers.org.**

♦VIRGINIA♦

One Week of Sanctuary Beekeeping & Gardening, July 10-14, Floyd, VA with Gunther Hauk, Alex Tuchman and Vivian Struve-Hauk.

For more information on both events visit **www.spikenardfarm.org or contact info@spikenardfarm.org, 540.745.2153**.

♦WASHINGTON♦

The NW District Beekeepers Association will host Randy Oliver, September 9 at Everett PUD Auditorium, 2320 California Street, Everett, from 1-5;pm.

The cost is $25 and seating is limited. Tickets can be purchased at **www.brownpapertickets.com** by searching for Randy Oliver.

For more information contact Mike Kossian, **MikeKossian@hotmail.com**.

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Two Dollops Of Honey

Ed **Colby**

By the time you read this, it'll be over. But right now, in the merry month of May, I wake up in the wee hours worrying about Paypal buttons and parking.

The occasion for my concern is the upcoming Colorado State Beekeepers Association Summer meeting. I'm the CSBA president, and we're holding this event here in rural western Colorado, literally in my front yard.

For me, day one kicks off with an early morning trip to Grand Junction to pick up our main speaker, Katie Lee, from the University of Minnesota and the Bee Informed Partnership. She'll bring a Dewar, or vacuum bottle, that we're going to fill with liquid nitrogen. She's going to show us how to freeze honeybee brood to test a hive's hygienic behavior. I need to get her back here to the farm and checked into the little guest cottage behind the house, then out to Paul's beeyard to get set up.

That afternoon the Porta-Potties have to be in place here on the farm, because we're having a CSBA cookout and potluck. I'm going to need more grills, so we can cook up Jem, who only last summer contentedly chewed his cud in the orchard.

The gal Marilyn drives a school bus, and she just came back from a junior high band field trip. She said, "We should get the kids to play for the potluck!" I pictured a marching band clashing cymbals and parading up and down the driveway in snappy uniforms, as beekeepers chomped on Jem. But no. The local kids have a jazz band. Still, Marilyn knows the band director, so maybe . . .

Folks are calling here asking how to register for the meeting. Our website needs help. We're hiring a webmaster, hopefully tomorrow, so that attendees can at least sign up and pay online for the events that take place in 30 days. But it's not a done deal, and this is yet another matter I ponder in the middle of the night.

As for getting some sleep, I take my two big dollops of honey before bed, and it helps. When I eat honey, I have the most vivid dreams! I just had one about a nurse. I dutifully reported every detail to Marilyn, who merely chuckled. You don't think honey before bed makes you dream? Try it! But I still wake up. Sometimes I have to tear myself away from lovin' arms to re-arrange myself on the couch, where I generally tumble back into dreamland. But what is it about the pre-dawn hours?

I drove down to the Capitol in Denver to watch legislators unanimously pass the Highway Pollinator Resolution. It designates the I76 corridor from Denver to the Nebraska line a pollinator-friendly zone. We can expect to see bee-friendly plantings and reduced spraying and mowing.

When I rallied beekeeper support for the resolution, I caught some flak from a friend who worries that drift from neonicotinoid-treated fields might poison the pollinators we're trying to help. My response: At least maybe they'll die with a full stomach! Look, we do the best we can.

Right now I'm dividing my strongest colonies. Here's how I do it: I pull the top brood super off a two-brood-super colony and set it aside. It should have some brood in it. It generally will. Then I pull a couple of frames out of the lower super. This leaves a hole in the hive. I pull each frame out of the top super and give it a good shake into that hole into the lower box, knocking off the bees. I then lean those frames against another hive. When I've emptied all nine frames of bees, I bang the empty top super on the lower one, knocking off any remaining bees.

So now all the bees, including the queen, are in one box. I put a queen excluder on top of that box and put the empty top super on top of that. Then I replace all the frames. I give these bees an hour or two to repopulate that upper super. Then I pull it off and take it at least three miles away, so that forager bees from this new hive don't get confused and return to the wrong hive.

The next day I put in a new queen, the easy way. I expose the candy plug in the queen cage and let the bees release her. I put the cage between two frames in the middle of the hive and push it down with my hive tool. I don't touch that hive again for ten days.

By splitting my hive, I've reduced the chances it will swarm, turned one hive into two, introduced a new queen, and halved my mite load. Not bad!

A box of Carniolan queens sits on the kitchen table as Marilyn bakes rhubarb bread. The little darlings piped for us at supper – long, plaintive, high-pitched tones, followed by a series of short toots. It was music to this beekeeper's ears. Tonight it might even lull me to sleep.

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