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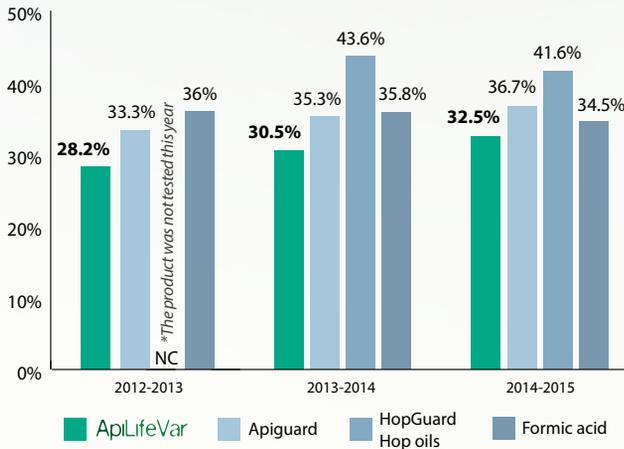
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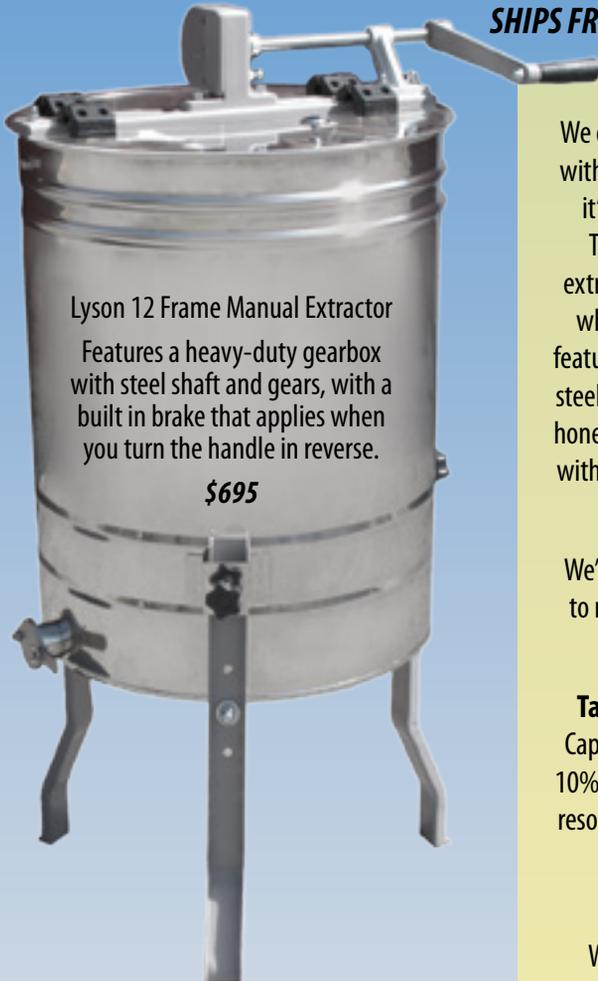


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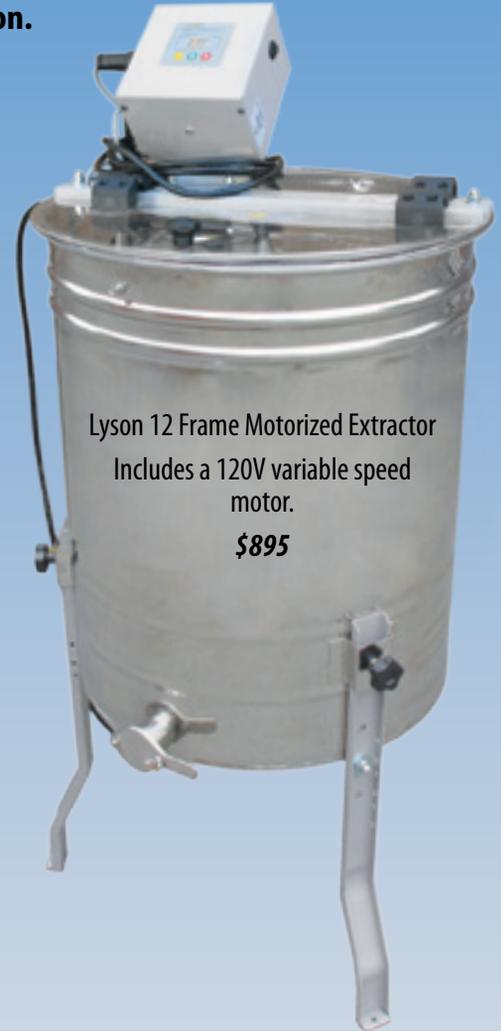
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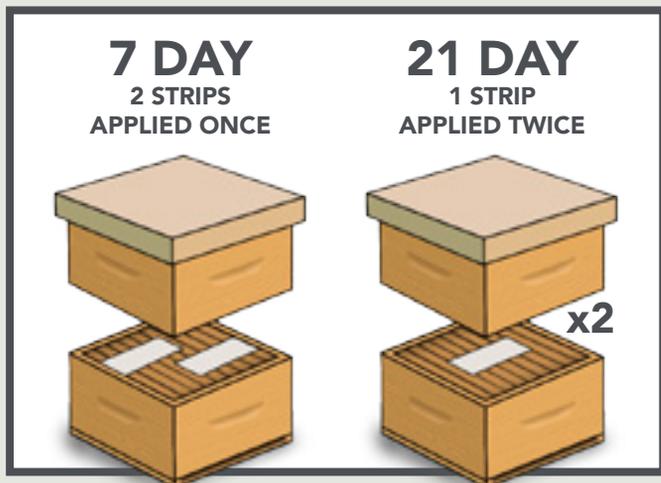
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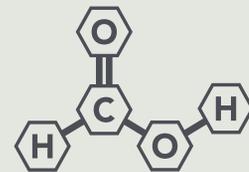
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Bees & Granddaughters

I want to share a story about the influence of having grandparents who keep bees. Our five-year-old granddaughter came to spend the weekend and was recovering from strep throat which caused her to have hives. As she got out of the car, she tells me "Grandma!!! Look, I have beehives!!!"

I enjoy *Bee Culture Magazine*. I like to read about the chickens. The columns that help me the most are the Q&A ones. Thanks for all you do for beekeepers!

Bev Tucker

No Bees

After taking a couple year hiatus from *Bee Culture* magazine, my wife got me a subscription for Christmas. I received my first issue last week and was pleased with most of the articles. That was until I got to *The Climate and Agriculture* by Joe Traynor. Has *Bee Culture* become a political magazine? Not once in this article were bees mentioned. I sure hope this isn't going to be a pattern for future articles.

Clint

Raw Honey

In reading Ed Colby's article in the Feb issue I had to respond to a term that I just cannot stand. *How Can Honey Be Raw?* You do not cook it to make it consumable. It is not like an egg. For some reason this has become a generic term for NATURAL honey. I try to educate my customers on this however if the industry uses the term it is a lost cause for a small beekeeper like myself. Please, let's get back to using NATURAL HONEY.

I believe this got started when a local Baltimore couple from Venezuela started a company and called it REALLY RAW HONEY. What they are selling is honey directly from a producer's barrel with out cleaning out wax and debris left from the extraction process. As the resulting product crystallizes quickly they convinced local health food stores that this is a sign of good honey.

Thanks for letting me vent.

Robert Crouse
Maryland State Beekeepers

Added Sugar

The February 2017 *Inner Cover* interpretation of "Added Sugar" is not correct! "Added Sugar" is not an ingredient statement, but a nutrition label statement notifying people of the component of dietary intake. Of course there is no added sugar in honey – but honey is an added sugar to your diet. The FDA considers honey to be a food consistent with the concept of empty calories. The FDA hopes people see "Added Sugar" and think "oh- I am adding sugar to my daily food intake – this will make me obese" and not "this product has sugar added to it." The Added Sugar declaration for a serving of honey will be 17g.

David Tremblay
Vermont

Treatment-Free Debate

Although I have progressively come to expect a fair amount of derision involving the treatment-free debate in the bee journals, the January 2017 issue was particularly disheartening. The *Inner Cover* section on p. 21 and the *Downtown – Varroa Bombs Are Real* article on pp. 72-74 both assume a couple crucial things. First, although the authors seem to allow for the possibility of different reasons that "treatment-free" beekeepers do not treat, i.e. "some by ideology, some by indolence [laziness]" (p. 73), I think there's a big distinction between beekeepers who neglect to treat their hives for *Varroa* when they should, and beekeepers whose management for *Varroa* does not involve applying physical in-hive treatments (chemical, "natural", "organic", or otherwise). I think when it comes to combating *Varroa*, there's a wide spectrum of strategies, varying from defensive to offensive, as well as oblivious (no strategy). In my opinion and experience, "treatment-free" does not usually equal oblivious, which I feel is counter to both authors' points of view.

Second, it seems like both authors assume that all versions of treatment-free management are completely ineffective. Yes, I'm well aware that "treatment-free doesn't

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work", but let's say for the sake of argument that it works well. That would mean that some *Varroa* are always present in true, long-term treatment-free hives, but in smaller numbers that never get high enough to be a significant factor. On the other hand, let's look at conventional hives which are sampled for mites throughout the year and are usually treated for mites several times a year. In this scenario, these hives would have a background low mite level just like the treatment-free hives, but at certain times of the year would have growing mite levels, or even spikes, right before a treatment is applied. So of these two scenarios, which one has the higher year-long average *Varroa* population? Under these generalized conditions, it is actually the hives that received sporadic treatments that would have the higher year-long average *Varroa* populations. The true treatment-free hive is no "*Varroa* bomb."





The “my neighbor gave me my *Varroa*” argument is something very real and worth considering for the conventional beekeeper, but I don’t think most treatment-free beekeepers really care too much about how high their neighbor’s mite loads might be. If treatment-free hives are coexisting with a constant background level of mites within their own hives, then it seems like the effects of drifting and robbing by neighboring bees from stressed hives would be negligible. After all, in a long-term treatment-free setting, the *Varroa* generally aren’t reproducing.

Here’s where I’m coming from: For my first decade, I kept bees conventionally, starting with fluvalinate strips, then adding coumaphos to the rotation, etc. as resistance changed. But for the last five years, I have been treatment-free on small cell/naturalcell, along with managing for strong hives and no supplemental feeding

except during package installation (or emergencies, which haven’t happened yet). This approach, in my opinion, is offensive in terms of *Varroa*, rather than defensive or oblivious. Hive health has been phenomenal, wintering has been great, honey yields have sometimes been over double the state average, and in most years I go without seeing an adult *Varroa* mite, even on drones. I just can’t think of a good reason to go back. And I’m not alone.

I, and many other true treatment-free beekeepers care just as much about bee health as anyone else. I’ve worked hard and taken on a lot of risks to hear that I’m an “idiot” (p. 72) and committer of “criminal acts” (p. 21). I think you’re pointing at the wrong group of people. Or at least a group of people you don’t fully understand.

I realize that the main point of both authors was to rightly scare every beekeeper out there who has no *Varroa* management plan into doing *something*. But the point I want to get across is that sometimes true treatment-free beekeeping *is* doing something. I would just argue that the *something* I described is a better, easier, and more effective *something*.

Mitch Valerio
Ohio

More About Goat Meat

I just read the Letters in the March issue of *Bee Culture*. I am sorry I missed Jessica Louque’s comment about goat meat. Actually any meat, badly butchered and badly prepared can certainly be ‘gross.’ I’ve eaten that. But correctly butchered and nicely prepared goat meat is exquisite. I have eaten goat in many countries (very popular in a number of them) and also from my own fields and have found it nicely lean and with a mild flavor. Many recipes, with and without honey, can be found. Since it is a lean meat, it is a healthy-to-eat-meat. Find a recipe and enjoy!

Ann Harman
Flint Hill, VA

Veteran’s Journey

In late 2013 I wasn’t in my best shape. After a decade of service I was departing the U.S. Army with severe physical and psychological trauma. These issues impeded my ability to be a Soldier any longer and at 29 I had to reevaluate where my life was going. I had anticipated being a Soldier until I was at least 40, but my service busted me up pretty bad. I don’t regret serving for a moment, but it’s humbling at 32 to have a messed-up spine, a



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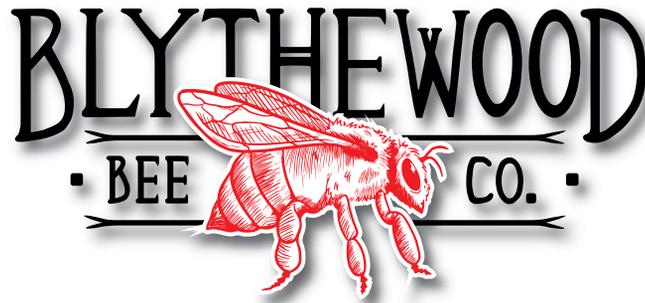
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bad knee, and chronic pain. Severe anxiety issues came with all of it. I'm proud I could push through the last few years of service in my condition, but I was no longer the tank I was in my early 20s.

I had a lot of setbacks in 2014 – my first year out. Getting proper insurance and care for my three special needs children, working to mend a broken marriage, and trying to find myself professionally. I even was laid off from my first post-Army job just 90 days in! I'm ashamed to say in private I hid how bad I felt from my wife and boys and called the VA's Crisis Line a couple times a month. Physical therapy and mental health also helped me rebuild myself. I can personally attest to the despair many disabled veterans feel post-service. Leaving the uniform and having limited options post-service can ruin your entire sense of identity.

My garden has been the place I could usually find peace. As I worked hard each day making calls, taking calls, and sending resumes to find new work I found my garden was at its apex and I had so much idle time with the kids at school and my wife working. Chores and most of the work were finished by 10:00 a.m. What was I going to do?

I have always been curious about beekeeping. Growing up in the 90s the Byzantine Catholic Church that was one behind our home in Ashtabula, OH had a number of hives. I was always intrigued by them when I saw the small Mr. Sass with no hesitation work those hives without a beesuit on. They were always so lively and I had little fear going near the hives. I was always too shy to ask about them, but the idea of giving it a try has been in my head since I was 12. I did a little urban gardening each year growing up with melons, tomatoes, and strawberries. As a Soldier I could keep doing that with

small raised beds, but with how frequently we moved and living in post housing hives were never really an option. Yet, with my idle time that changed. I thought it wouldn't hurt to research the subject.

I began by reading Dr. Keith Delaplane's *First Lessons in Beekeeping*. A friend in Ohio mailed me Amos Root's *The ABC and XYZ of Bee Culture*. I went on YouTube and watched Dr. Delaplane's *Year in the Life of an Apiary*. I was smitten. It took compromises with my spouse, but we agreed to two hives on our property outside of Baltimore, MD. That Christmas my wife bought me my first two unassembled hives. I worked hard to make them sturdy and look lovely. I ordered my first box of bees and was counting the days until early April.

April did come, but the abnormally cold Spring was delaying the bee delivery and pushed it to May. I had only one box coming due to my budget. I went back to research capturing swarms and put out Craigslist posts that spring looking for swarms and contacted local beekeeping groups. Three days after beginning my search I received the swarm call for some bees hanging low on a tree in Annapolis. The excitement of loading up my truck with a plastic tub and half-cocked set up was akin to being a kid at Christmas.

On arrival, I could reach the swarm and work the 4lbs of bees standing on my truck bed. They were beautiful golden Italians. I'll

remember giving them my first swarm shake until the day I die. The mixture of excitement and anxiousness makes me smile as I write this. In only a veil I was happy none stung me. As dusk came the bees all entered the plastic tub with the small hole I had drilled. I had a small quiet dinner by myself observing them.

They were my first bees and my most industrious. They rewarded me with an entire medium of surplus honey that 4th of July. I can't put my finger on it, but no matter how bad I'm feeling or how frustrating life can be sitting down and simply watching the girls come and go brings me a peace I can't put my finger on. Beekeeping has taught me greater patience and made me feel reward again. Even my worst mistakes at the craft were good lessons. My free time was spent researching more about bees and expanding them.

Two years into my journey and I'm in the best place I've been in my life. My marriage is strong again. My boys are happy and getting the services they need. Professionally I'm with one of the most elite firms in my trade and am more successful than ever. I'm on a popular show on CBS making myself a quasi-celebrity and acknowledged nationwide as a guru in my field. My two hives have grown to eight with me working to build a beeyard at my local community garden to eventually house 16 hives and six nucboxes.

Anticipating 2017 brings me more joy than you can imagine. My greenhouse is returning to life with seedlings. My bees are doing their first orientation flights with the first-born bees of the year. I'm preparing to put out my lure boxes on the first week of Spring. I'm training my first apprentices at the community garden who want to try their hand at beekeeping. By this Fall my hope is the first plot at the garden goes from the four hives there currently to eight hives and three nucboxes. They're my dream for Spring.

Apiculture renewed the confidence I had lost in myself due to a low point.

They might have saved my life.

Charles DeBarber
Baltimore, MD

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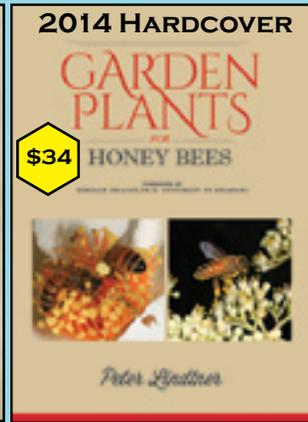
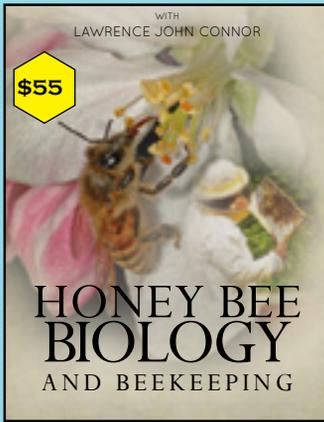
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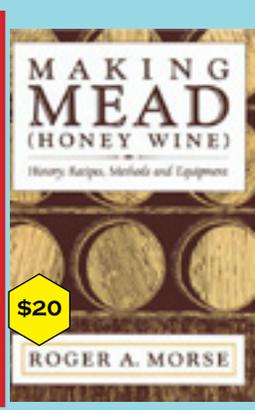
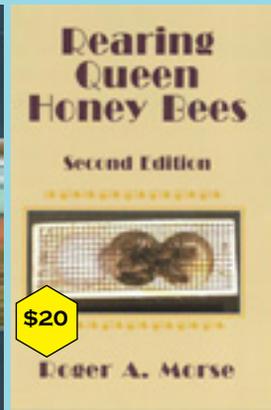
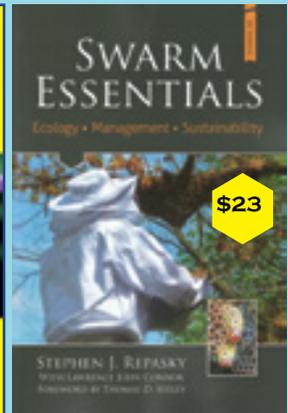
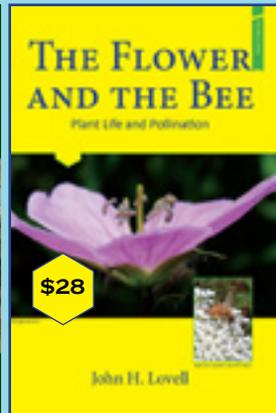
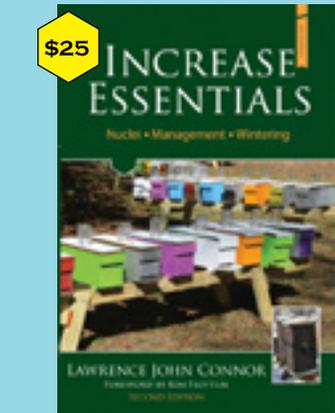
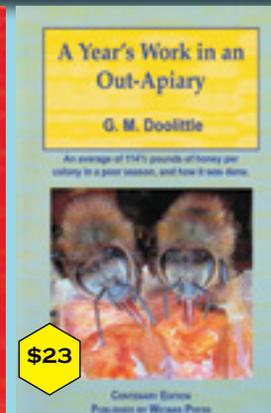
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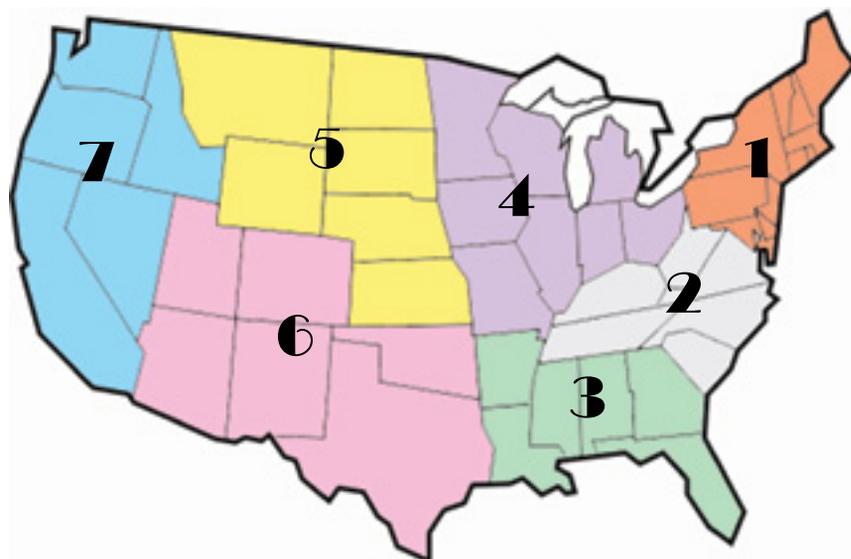


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APRIL - REGIONAL HONEY PRICE REPORT



Winter
So Far . . .

Honey prices keep coming up in discussions, so we took a look at January vs. April prices on our report. Bulk prices are absolutely flat. For wholesale, as many products are up as are down with the bigger container increasing a tad. For retail however, everything across the board is down, with the exception of cut comb. Not by much – 8 – 12% on average, which is odd, considering wholesale is up. But, that’s first quarter.

In the meantime, in very early March we polled our reporters on wintering so far – March is too early to say for sure, but it’s the first time

many have had a chance to take a look, usually, except this year of course because of being mild somewhere sometime this Winter. In NE Ohio, 60s and 70s in Dec, Jan and Feb meant cleansing flights, pollen searches and lots of eating. But, at least it was warm enough to feed.

We asked about feeding last fall because Fall was so weird in so many places last year – very late in some, none in others, so how do you make up for that. 22% over all felt they didn’t need to feed with region one the highest in this category with 41%. Overall, 31% fed carbs only, 1% protein only and 35% both.

Treating for *Varroa* is on most folks Fall to-do lists, and, sure enough, 76% did some sort of treatment, with a few treating twice with different compounds. Formic was most commonly used with 26% using that, 16% used oxalic acid, 19% used Apivar, 9% used Apistan, 3% used the Amitraz product, and 6% used Hoggard.

Additional protection in the form of moving to shelter or warmer climates was practiced by only a handful of our reporters. Fewer than 5% move to almonds, and even fewer overwinter in a building. But wrapping – well, some do. 21% use some

sort of protection including roofing paper, plastic insulated wrap, Styrofoam sheets and the like. Not surprisingly, Region 1, the Northeast had the highest with 44% using some sort of wrap. Region 3 had none.

Because it’s been so warm, by early March almost everybody had a chance to take a peek inside. Fully 50% said things were as good as they expected, with 15 saying they were even better. Losses so far were pretty low, looking at only 5% so far, but, it’s early.

REPORTING REGIONS										SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	\$/lb	Last Month	Last Year		
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS														
55 Gal. Drum, Light	1.75	2.01	2.31	2.48	2.75	1.93	2.60	1.50-3.70	2.24	2.24	2.30	2.24		
55 Gal. Drum, Ambr	1.68	1.97	2.03	2.42	2.30	1.93	2.60	1.35-3.65	2.10	2.10	2.21	2.11		
60# Light (retail)	216.11	191.67	211.67	203.02	177.00	200.35	250.00	120.00-300.00	208.78	3.48	197.81	203.88		
60# Amber (retail)	219.44	188.67	197.50	199.96	208.94	203.05	250.00	120.00-300.00	207.88	3.46	203.17	201.12		
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS														
1/2# 24/case	87.80	76.10	88.80	58.64	51.84	86.40	144.00	51.84-144.00	83.36	6.95	81.16	84.97		
1# 24/case	126.64	107.07	120.27	113.65	127.16	109.90	179.20	45.00-230.00	121.98	5.08	120.90	118.83		
2# 12/case	112.31	91.38	106.90	97.58	97.44	101.60	147.00	78.00-180.00	108.17	4.51	112.82	108.33		
12.oz. Plas. 24/cs	101.21	84.08	92.00	112.31	74.40	104.40	128.80	66.00-288.00	102.15	5.67	95.40	97.76		
5# 6/case	132.62	108.63	98.00	117.80	102.30	121.00	180.00	71.50-180.00	124.47	4.15	125.29	121.16		
Quarts 12/case	169.11	128.90	128.84	138.85	155.32	144.12	186.00	110.00-240.00	143.83	4.00	145.41	141.24		
Pints 12/case	101.65	88.40	73.20	89.77	111.00	76.32	102.00	60.00-144.00	87.65	4.87	89.61	87.87		
RETAIL SHELF PRICES														
1/2#	4.93	4.12	4.44	4.08	3.59	4.50	6.67	1.96-7.75	4.64	9.29	4.59	4.36		
12 oz. Plastic	6.02	4.92	4.50	5.42	4.35	6.77	7.68	3.25-10.00	5.67	7.56	5.97	5.38		
1# Glass/Plastic	7.09	6.69	6.44	6.62	6.66	6.97	10.60	3.00-12.00	7.13	7.13	7.57	6.93		
2# Glass/Plastic	12.16	10.56	11.38	11.64	11.77	12.00	17.75	6.00-21.50	11.98	5.99	12.13	11.75		
Pint	11.74	9.07	7.77	11.10	8.92	9.75	13.73	5.00-20.00	9.85	6.56	9.33	9.73		
Quart	17.03	15.78	15.12	15.15	15.63	17.68	26.05	8.00-40.00	16.95	5.65	17.29	16.10		
5# Glass/Plastic	26.80	24.54	31.50	24.67	22.20	27.02	35.00	15.00-39.95	26.14	5.23	25.92	26.16		
1# Cream	8.83	8.85	11.25	7.95	9.91	7.73	10.50	5.50-16.00	8.91	8.91	8.89	8.41		
1# Cut Comb	12.62	9.13	7.50	8.85	12.50	9.25	15.67	6.00-22.00	11.31	11.31	10.71	10.88		
Ross Round	9.88	6.73	9.31	10.75	9.31	10.25	9.20	6.00-12.00	9.62	12.82	9.15	8.73		
Wholesale Wax (Lt)	7.24	5.09	4.75	5.20	6.00	5.31	5.63	1.90-10.00	5.81	-	6.30	5.82		
Wholesale Wax (Dk)	7.13	4.75	4.21	4.71	5.56	2.75	5.25	1.85-10.00	5.20	-	5.49	5.39		
Pollination Fee/Col.	89.44	73.75	60.00	77.50	103.95	95.00	200.00	45.00-200.00	85.40	-	86.14	84.39		

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INNER COVER

Been watching the price of honey lately? Our monthly honey report has been on a slow but steady no-movement-at-all flatline for about a year now. Partly because we keep asking the same questions of the same people in the same markets. Still, essentially no movement in a year?

When you watch the commodity players, those who buy containers, barrels, truckloads, tankers, it's another story. Down she goes, faster and faster and faster. The big buyers are paying in the neighborhood of \$1.60

- \$1.70 a pound. Smaller buyers are paying just over \$2.00 a pound. That's for US produced honey.

In 2015 the US produced 156 million pounds of honey. We imported 371 million pounds. Predictions for US production in 2016 are about 15% lower (survey results out next month, stay tuned) for 130 million pounds. Imports are right on schedule at 370 million pounds. I'm not sure where that missing 25 million pounds disappeared to, but it may come out in the wash. Or, the influx of new beekeepers may be finally catching up and filling tiny cracks in the system. Add over 50,000 new beekeepers over the past three or four years and you're bound to find some honey.

But for the players, prices are getting tough. The four countries we import the most from are still Canada, India, Vietnam and Argentina. Combined, they account for 84% of reported imports. The other 30+ countries we import from don't amount to much. US honey is selling, at the commodity level, for right about \$1.65 right now. So if you're a honey user, where do you go if Argentina and Canada are selling their honey for right about a buck a pound, Vietnam's at \$.80 and India's at \$.90. Remember, I said commodity level. It used to be that most of the imported honey went for industrial use, like lubricating oil for road graders. The more refined products, that is US honey, went for table grade, grocery store displays. Pretty, and safe. That's changing if you look at Country Of Origin labels anymore. Almost, not quite, but almost everything at the brand name level is a blend anymore. Local producers, thank you, still have the pride and quality that stands out. You can see it and you can taste it.

We've recently talked about where beekeepers are putting their production energy. When you have an engine that can produce two products, one at a profit, one at a loss, the decision is easy. It's all bees, all honey, or maybe some of both if you can squeeze honey in between mite treatments and getting the bees to build back up after removing a bunch for - packages, pollination colonies, splits to make up losses, splits to sell, more packages, more splits. All the while keeping mites in check, the colonies queenright, and making up losses from pesticides and other stressors. It's bees, or honey, but not both. And it shows.

Our tiny industry is, dare I say, playing on a global stage. We have been at this for some time. A quick look at this same picture five years ago is enlightening, but not surprising. In 2012 the U.S. produced just over 147 million pounds of honey - even less than last year. We imported 312 million pounds, nearly 60 million pounds less than last year. That's 459 million pounds of honey used in the U.S. in 2012, compared to 527 million pounds last year - a 68 million pound increase. That's like adding a tad over a million pounds a month, every month, for all that time. Talk about added sugar.

Those same four countries that send us so much of the stuff have increased their market share here though. Five years ago they commanded only 66% of our imported market combined, compared to the 84% they have now. Then, Argentina had almost half of that share, today, Vietnam has almost half of that share. And the shares have gotten bigger. In fact, we import from Vietnam almost as much as we produce here. And, from where I sit, I don't see that picture changing much in the next five years. A

crop failure in Asia may temporarily alter the direction honey comes from, and that in itself may cause a spike, a tiny spike in prices, and perhaps an increase in demand for US product, but this market is both adaptable, and fluid so it will right itself quickly, back to Asia, or all the rest will pick up the slack some.

I also see a blip when the new nutrition label comes out, if it doesn't get fixed in honey's favor. But it will be a quick blip and then back to nearly normal. Dietary sugar is for the most part bad stuff for everybody, and, like salt and fat, will be tapered off at least some diets. But even a bit less for everybody won't tell much, because there are more bodies every year - making up that difference.

What started all this, actually, was a conversation I had with a beekeeper on the phone the other day. He was giving me a hard time about my favor for plastic foundation. My argument is, has and always will be time is money, and recycle the plastic. I put in new, wait two years, melt it in the melter and recycle what's left. Save the frame, toss the rest. Time is money. I don't have enough of either, but I can save time.

I buy uncoated, brush on a tiny bit from, would you believe a 51 year old store I have, and in it goes. Bees use it. What more can you ask for? But what happens when that block of gold I have is finally gone? Where oh where will the next block come from? And that was the question.

If the trend for producing less honey continues, for whatever reasons, one result will be less beeswax. Of course, it, too could be imported, and at a probably reduced cost compared to the \$4 or \$5 a pound folks are paying now when you buy it by the ton. But will it be clean? Can it be cleaned? That, friends, is the real question in my book. Honey is a commodity. Bees are a commodity. But what about the wax?

There's an article inside on using Facebook as an advertising medium. We do it some, probably not enough, but that's soon going to be changing,

Honey Prices. Imports. More.

and I don't use it on any regular basis, but a couple of our people here visit and watch and read what's there a lot. On Bee Culture's Facebook page we run a photo contest every month, each with a different theme. Last month it was candle displays, before that winter beeyards, and this month Spring flowers with bees. A winner is chosen each month, nominated by the Editor, but it's not just the Editor who gets to choose. Our whole department gets to. And as much as I'd like to think the best choices are strictly beekeeping focused, it turns out we have more art people than beekeeper people, so it ends up being the best of both most times.

The prizes are nothing to sneeze at either. The Editor's Choice award is a \$100 cash, and a signed copy of *The BackYard Beekeeper*, by, yes, the Editor.

The Staff Pick Award is a two year digital, AND a two year paper subscription.

We try and pick topics just after they are seasonally highlighted, so take a look at upcoming topics and plan ahead, so you already have them when the time is right.

May – Packages

June – Summer beeyards

July – Bees and water

August – Harvesting honey in the beeyard

September – Honey Houses

October – Beekeepers at the fair

November – Fall flowers with bees

December – Your favorite beekeeper portrait

If you don't do Facebook, you can still enter, and win. Go to our web page, www.BeeCulture.com and in the upper right hand corner you'll see the Photo Contest link. Click, fill in the forms, read the rules and you're ready to go. You can enter as many as five each month (we have to keep some room for the rest of the page you know). Or simply go to Facebook, search for Bee Culture magazine and there we are.

Once you've entered your photos, they go through a quick filter here – we did have an extremely attractive lady once share some – ummm – photos with us, so before they get posted for everybody to see, we want to be sure they are of the right topic, and – ummm – the right topic.

Then, at the end of the month we get a chance to take a good look, we make two decisions, and spread the word for the winners. And you get notified, and maybe a check.

So get out your camera – you remember what that is – or your cell

phone and start looking for each of those topics. You could do a portrait tomorrow and wait, or packages this month for next!

We're gearing up for a couple of events this Summer. The first, our Annual Pollinator Day, will be July 15. That's a Saturday and it'll run from about 9 in the morning to about 4 in the afternoon. We keep expanding our gardens and will have several more this year. We have already a Natural Pollinator mix from Ernst Seeds out in PA, an all wild flower pollinator mix put together by Ohio Prairie Nursery and sponsored by the Ohio State Beekeepers Association, a phenology garden maintained by our local Master Gardeners, three plots by the Pollinator Partnership people, one a research plot for pollinator counts in Northeast Ohio, one an all legume plot and another a wildflower mix, both for planting alongside agriculture fields to give pollinators a safe haven from pesticides. We think they will have more this Summer, but it's in the planning stage.

New frost plantings this winter are two off-the-shelf mixes, one from Tractor Supply that has fertilizer and mulch mixed in for homeowners, and another from Town and Country Co-op, here in Ohio. We have plans to put one in sponsored by a new group that's affiliated with Pheasants Forever, called The Bee and Butterfly Habitat Fund, and we are looking for some more off-the-shelf mixes to test. We want to have an idea of what works, or works best anyway for this part of Ohio so when folks visit we have some good information and something they can actually look at.

During our Pollinator Day we have representatives from most of these organizations set up a table and are available for questions, hand outs, catalogs and the like for your benefit. Plus, we'll have Medina County Extension people, Master Gardeners, OSU Pollinator Extension, Medina County Soil and Water people (they are doing a bang up job of getting pollinator gardens going in our part of the state). This will be the third time we've tried this and it gets bigger every year.

There'll be a bee tent with demos ongoing if you want to see how Medina Beekeepers do their stuff, lots of good food, cold drinks and snacks. Lots of shade if it's hot, and attendance is free. Come early, park, walk the gardens, talk to the experts, see the flowers, enjoy the day. And

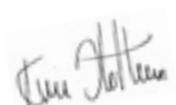
while you're here, take a look at the streetside pollinator plantings we've put in on both sides of the street. The Root Candle Company sits on. We're expanding these plantings this year too, so you can stroll along the sidewalk, look at the parking lot planting and just behind that parking lot is more than a couple acres of paths, gardens, demos, tents and people who want to help your bees.

OK, if that isn't your cup of tea, think about this. *The Voices Of Bee Culture* will be here in Medina on September 22, 23, and 24. Almost all of our regular writers will be here for at least a couple of those days to meet and greet and share in person some of the wisdom you get to read only once a month. We'll be missing a few – talk about herding cats – but with a lot of luck all will be here in person or electronically, sharing the same wisdom and thoughts they would if actually here. Come and meet Clarence Collison, Ann Harman and Jim Tew who have been writing for us longer than I've been here, Phil Craft (ask a Q in person!), Toni Burnham, Larry Connor, Jay Evans, Jessica Louque, Kim Lehman, Ross Conrad and Ed Cobey (and maybe his gal Marilyn!). A couple of folks can't make that date, but we hope to have Connie Bright and Jennifer here on the big screen, live if we can, so you'll at least get a flavor of their presence. And of course life will change between now and then, so some may not be able to make it in person, and some who don't think they can will. We'll keep you up to date here.

Friday night will be meet and greet in the *Bee Culture* Conference Room (where everything is held by the way), followed by a Saturday of talks and conversations (this isn't going to be terribly formal, but we'll have some talks and discussions on topics of the day, or what's on your mind), a TERRIFIC Lunch followed by a few more folks, then essentially the same on Sunday with the rest of our regulars.

The whole *Bee Culture* crew will be on hand to help hold all this together, and maybe a few surprises along the way will happen. We'll see about that.

So, *The Voices Of Bee Culture*, September 22 – 24, 2017. Mark that one on your calendar for sure, and watch these pages next month for the rest of the particulars.



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It's Summers Time –

Turmeric, Chickens, Ducks and Wooster

I wish that all of you were having the kind of Winter that we are. We have been very fortunate here in Medina County this Winter. I know it's not over yet, but we're on the downhill side. We did have some exciting wind yesterday that took out a bunch of trees, even tipped over a couple of semis on the freeway and a lot of folks lost power. But today, back to calm and sunshine.

A couple of years ago we bought a turmeric plant at our local Farmers' Market. It was a beautiful plant – my main motivation – since then I've been reading and hearing a lot about turmeric being really good for you. So Kim decided to 'dismantle' this beautiful plant so that we could harvest some of the root. You can see in the photo that it also actually bloomed last Summer and what a beautiful flower it has. I just like the plant. We're still reading up on exactly what to do with the root and how to process it. We'll save some and replant also. If you have any suggestions please send them along.

We'll be getting more chicks in a few weeks. And we're going to try the Call ducks again. The coop is bigger and the pen will be better protected, so hopefully we can get the ducks grown and keep them in the pen where they are safe. Right now we have 15 hens – five of them are five years old right about now and the other 10 are two years old. I think we're about to lose one of the old Americanas – she's really starting to slow down and having a hard time getting up to the perch at night. But she doesn't seem to be in any pain and is still quite tame with me.

I know some of you are thinking soup pot, but I just can't do that. They're essentially pets, although they don't really have names like Kim tells everyone. Besides they're mostly feathers. They look real poofy, but when you pick them up – not much meat under all the feathers. So we'll keep feeding them and loving them until they go naturally.



The *Bee Culture* Team – minus Editor Kim – was at the Tri-County Beekeepers Conference in Wooster, OH the first Saturday in March. We saw a bunch of you there and we had a great time. Kim was sick with the nasty bug that has worked it's way all around our department. He hasn't been that sick in a long time. Thank you to all of you who asked about him and missed him.

The rest of the team, including two new members this year, did an amazing job of making my day easy. We had Jean, our advertising sales person and she brought along her son Jake, who helped out at the table. Amanda and husband, Matt were there – thanks Matt for lifting and toting – and getting me that amazing maple roll. They brought along Anthony, who is one sweet little boy. This is his second big bee event – if you came to our October event last year he was there – and he is amazingly cooperative and agreeable. He only gets a little cranky when he's hungry – like most of us. It was good to be there and see good friends.

Happy Easter and Happy Spring to all of you. Check out Kim's *Inner Cover* for the upcoming *Bee Culture* activities this Summer and Fall.

Hope to see you at one of them!

Charly Summers

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New For The Beekeeper –

HB HIVE CO. PROTECTS HONEY BEES WITH INVENTIVE BEEHIVE AND BEEHIVE FEEDER

HB Hive Company, located in Belchertown, Massachusetts, recently announced the launch of its new beehive and beehive feeder system. The Hartman beehive and patent-pending beehive feeder offer integrated features to feed and care for honey bees, including the ability to feed the honey bees and check sugar syrup levels without opening the hive; vents to deliver critical air circulation; and tools for pest management.

“Our beehive and beehive feeder system were developed from our own beekeeping experience,” explains Ross Hartman, president HB Hive Company. “Like most beekeepers, we did a lot of MacGyvering to provide our bees with the optimum environment to flourish. Eventually we started from scratch and built a beehive and feeder that incorporated our new ideas with best beekeeping practices. The result was a system we believe other beekeepers will appreciate.”

The patent-pending Hartman Beehive Feeder, by HB Hive Company, gives beekeepers the ability to feed the honey bees without opening the hive. This protects the honey bees from the elements on inclement days, discourages robbing, and is less invasive to the hive in general. Beekeepers fill the provided pitcher with sugar syrup, attach the pitcher to the quick-connect port in the feeder, and the sugar syrup automatically flows to fill the feeder. The honey bees access the sugar

syrup from inside the hive, through a narrow opening in the special feeder framework. Beekeepers have the option to remove the feeder from the outer framework and place it directly into the hive, which is filled through the same quick connect port, and monitored through a viewing window.

The Hartman Beehive is inspired by the vertical Langstroth hive. With a strong focus on integrated pest management, the custom hive base includes a sliding screened bottom board, Correx board for *Varroa* mite inspection, and a beetle trap tray. The screened bottom board slides out for inspection and cleaning. Three sliding entrance reducers offer multiple entrance size options. Viewing windows in the deep brood box and super offer a sneak peek into colony activity. Beekeepers control hive temperature and humidity with screened vents in the roof and base.

“Honey bees are vital pollinators who deserve our protection and attention,” explains Hartman. “We hope HB Hive’s products will catch people’s interest and inspire them to join our beekeeping community.”

Made in the U.S.A., HB Hive’s Hartman Beehive and the Hartman Beehive Feeder are available direct from the manufacturer and can be purchased on the company’s website. For more information visit www.hbhivecompany.com, email info@hbhivecompany.com or call 855-542-4483. Follow the company on **social media @hbhivecompany**.

ABOUT HB HIVE COMPANY

Established in 2016, HB Hive Company designs and builds beekeeping equipment with unique features and high-quality craftsmanship. The company is comprised of beekeepers and craftsmen, whose expertise ensure delivery of products with enhanced functionality and impeccable construction. HB Hive Company is privately held and headquartered in Belchertown, Massachusetts. For more information please contact the company at 855-542-4483, email info@hbhivecompany.com or visit www.hbhivecompany.com.

“Best doggone feeder.....”



There are as many ways to feed your bees as there are beekeepers’ opinions, but have you tried a quail-honey bee feeder? Developed for feeding day old chicks and quail, this opaque plastic jar, through which you can easily see the syrup level and “non-drown” base has proven to be easy and reliable. The wall of the base is straight and only 5/8” deep, providing a 9/16” narrow trough, greatly reducing drowning. Up to three gallon size feeders can sit on the frames of a 10-frame hive with an empty deep super around them. Half gallon and quart jars with similar “non-drown” base fit perfectly in NUCs. These feeders are ideal for spring and fall feedings, but also works in below freezing temperatures if needed!

By placing one to three gallon feeders in the hive you’ll have a constant source ready and waiting for your colony. One Michigan beekeeper who uses these in all of his hives in the Fall says, “It is the best way to flood the brood nest with food and keep the queen ramping up brood production with the simulated nectar flow. They put this feed where





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they will need it during the Winter, just above the Winter cluster. The bees will store three gallons in just a few days.” Picture your bees lined up wing to wing, feasting on an almost endless supply of syrup, endlessly providing you keep the jars full!

If you’re a backyard beekeeper or have a hundred or so hives, this feeder could be a real asset. One word of caution, be careful on hives that are not level that the supply hole is on the low side so that it shuts off before running over the edge and down into the hive. You can find the one gallon quail-honey bee feeder (Item BZG49) along with ½ gallon and quart size at www.cutlersupply.com or contact them at (810)-933-9450 or sales@cutlersupply.com.

Varroa Cannon

The company was started in 2016 to promote a Commercial-Level Oxalic Acid Vaporizer. The use of Oxalic acid has recently been approved in much of the U.S. but there are few options for large scale application. Most devices are designed for hobby beekeepers and are extremely time consuming to use. The *Varroa Cannon* allows for the treatment of many hundreds of hives per hour. It is a heavy duty, precision machine. Along with a small compressor and generator the Commercial operator can treat 2000 hives or more in a single day! The cost of treatment is also quite low-pennies per hive!

One of the features of our machine includes the ability to field clean and/or replace parts as needed. Just open up and replace what is needed and be back treating again in minutes not days. Another unique option allows for precise temperature and air control at your fingertips. This allows for on-the-fly changes to accurately apply optimized vapor into each hive. Without this control, it is possible to overheat the oxalic acid crystals and render the treatment, at best, ineffective. But above 372°F (189°C), oxalic acid decomposes into formic acid and carbon monoxide as well as carbon dioxide and water. This potential ‘blast’ of formic acid can be hard on the bees. Oxalic acid vapor has been tested well above the recommended two grams per two box hive without any negative effect.

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The Bee Gym is a simple device that is placed inside any hive to encourage bees to groom *Varroa* mites off their bodies. It has wires, flippers and scrapers on its small (11 cm by 11 cm) plastic frame that bees voluntarily rub their backs and abdomens against to groom themselves of *Varroa* mites. The mites then fall through a normal *Varroa* mesh floor onto a sticky insert or to the ground from where the *Varroa* mites cannot jump back into the hive. The sticky insert should be regularly refreshed and the Gym should regularly be cleaned with washing soda.

The Bee Gym is a patented device invented by Stuart Roweth and tested successfully by many beekeepers and beekeeping groups in the UK and further afield.

“When I first saw a bee with a *Varroa* mite on it I was shocked by the mite’s size and immediately thought there must be an engineering solution to help the bees rid themselves of the parasite,” explained Stuart Roweth, beekeeper, lighting engineer and cameraman with several inventions in his portfolio.

Roweth started with a violin-style bow across the hive entrance and quickly noticed that the bees voluntarily used the wires to scrape *Varroa* mites off their backs.

also time-challenged. Our products are constantly being updated with the idea of adding to the existing, well-designed platform; no worries



“This was the moment I realised that honey bees could help themselves in the fight against *Varroa*,” he said. Appreciating that most mites cling to the underside of a bee’s abdomen led him through several versions until he came up with the Bee Gym for insertion inside the hive.

Dr Max Watkins, Technical Director of Vita (Europe) Ltd said “We have been very surprised and encouraged to see the mite fall directly below the Bee Gym in the hive. Clearly the bees are very keen to use the wires and scrapers on the Gym to rid themselves of their number one enemy. As one element of an Integrated Pest Management strategy, it is clearly a very useful, low-cost and chemical-free varroa-control device.”

Visit www.vita-europe.com/products/bee-gym for further information and a list of current stockists.

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FOUND IN TRANSLATION

Good Bug, Bad Bug

Jay Evans

As I finish this column on Super Bowl Sunday I am reminded of a sarcastic comment used to describe the game of soccer in the U.S. “Soccer is the game of the future . . . and it always will be.” As a longtime soccer dad, I am ever hopeful that the world’s game will reach its proper place at the top of local sports. I am not holding my breath and nor, apparently, is the rest of the country. The same might be said for probiotics. In human health and agriculture, probiotic treatments have received much attention over the years, leading to substantial research and development as well as commercial products. As a USDA employee, I cannot endorse or condemn the available commercial products, but I would like to discuss two research studies that provide new insights for the promising field of probiotics.

Both studies, one in Italy and one in the U.S., tested the impacts of bacteria found in the honey bee gut on levels of the honey bee parasite *Nosema ceranae*. In Italy, Loredana Baffoni and colleagues isolated and cultivated six lactic-acid bacteria found in honey bee guts (their paper is available at: DOI: 10.3920/BM2015.0085). They then combined these into a bacterial cocktail that was handfed to newly emerged honey bee workers. These bees were contained in relatively sterile cages in the laboratory. Five days later, half of the bees were handfed an infective dose of *N. ceranae* spores in sugar water while half were given sugar water alone. Bees that had received the bacterial mix prior to being exposed to nosema spores had significantly lower nosema loads than did control bees raised on sugar water alone. When bees were not fed nosema spores, those bees harboring nosema infections naturally also tended to have fewer

spores when they had been primed with the bacterial cocktail, although this result was not statistically significant. Finally, in all sets there was substantial variation in nosema spore loads that was not explained by the probiotic treatment. These promising results deserve field tests in an apiary.

Vanessa Corby-Harris and colleagues at the USDA’s Carl Hayden Honey Bee Research Center in Tucson have described an additional candidate for a bacterium that has positive effects on bee health (<https://doi.org/10.1093/jee/tow012>). *Parasaccharibacter apium* is found in both larval and adult bees. These researchers cultured an isolate of *P. apium* taken from bee larvae, and then set out to determine its impact on bee disease and bee health. Importantly, they first confirmed that this bacterium would remain viable when mixed into pollen patties under hive temperatures. Live bacteria survived well for at least 24 hours, arguably enough time to be consumed by bees in the hive. In addition, larvae from hives sustained with bacteria-rich pollen patties held more live bacteria than did larvae from hives with control pollen patties. They then tested the impacts of *P. apium* on nosema disease. Newly emerged bees from hives fed *P. apium* patties and bees from control hives were again handfed *Nosema ceranae* spores. After these bees were maintained in sterile cages for 10 days, bees from *P. apium* colonies showed lower nosema loads than did bees from control colonies. While the results await field trials, *P. apium* shows great promise as a ‘good’ bug. A similar study carried out by Ryan Schwarz, now at Fort Lewis College in Colorado, provides a sobering reminder of the need to get outside more. Working with Nancy Moran at the University



of Texas and myself, Ryan showed a substantial decrease in levels of the gut parasite *Lotmaria passim* when bees were primed with the gut bacterium *Snodgrassella alvi* – at least when experiments were carried out in sterile cups. Unfortunately, just the opposite occurred when those same bees were marked and released into colonies ([10.1073/pnas.1606631113](https://doi.org/10.1073/pnas.1606631113)). Inspired that it is at least possible to permanently tweak the gut microbes in bees through probiotics, Ryan and others are hot on the trail to find bacteria that have a positive impact in the field.

For those interested in a fresh take on the impacts, limits, and promise of gut microbes for human health (including when and how to eat a restorative poop sandwich), science writer Ed Yong has just written an entertaining book (“I Contain Multitudes: The Microbes Within Us And A Grander View Of Life”). The similarities and challenges for human and agricultural probiotics are striking, from clear benefits in some cases to less exciting results elsewhere. I, for one, remain optimistic that a science-based approach to developing probiotics will lead to more products that improve honey bee health. Then again, I missed the end of what I hear was a decent Super Bowl after going to bed with dreams of soccer greatness. **BC**

Jay Evans is the Research Leader for the USDA Honey Bee Lab in Beltsville, MD.

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One Hundred Years Down A Breeding Rabbit Hole

Bob Brachmann



Over the last 33 years, starting with the discovery of tracheal mites in the U.S., there've been many new challenges to honey bees and beekeepers. This was preceded by several decades of gradually shifting agricultural practices which likewise affected bees and their keepers. The following is an attempt to focus on one change which is seldom, if ever, mentioned but which has certainly had a major impact on the last one hundred years of apiculture in the United States.

During the 19th and 20th centuries there was rapid advance in understanding of the biology and behavior of honey bees. Dzierzon had described parthenogenesis and the division of labor within the hive. In France, team Huber (Francis, wife Marie Aimee Lullin, niece Jurine, and assistant Burnens) advanced the understanding of parthenogenesis, caste, and general biology, and also developed queen rearing procedures. During this same period there were many improvements in beekeeping methods, for instance, in New York, Quinby advanced methods of honey making, honey processing and queen rearing. In Austria, Hruschka built a radial extractor. Probably the most important development in beekeeping methods came, once again, from Dzierzon, who discovered 'bee space', this discovery followed by both Dzierzon and Langstroth each developing a moveable frame hive. Standing on the shoulders of these leaders beekeepers now had knowledge and methods that enabled them to make beekeeping their fulltime focus.

Up to about 1920 farms were diversified. Pastures fed horses and assorted livestock. The livestock gave back to the soil, enriching it. Cover crops sometimes fed the stock, sometimes fed the soil, and sometimes fed both. Horses (mostly) and people provided the labor and, ideally, people provided 'husbandry.' Usually the food for all the stock (include the people here) was produced right on the farm. If we look at a farm as different 'parts' (not the best way to look at it, but useful here), we could list soil, stock, plants, and thought/labor. (Water and sunlight are a given, though in varying annual amounts.) On a well-run farm in 1900 each 'part' supported and even improved every other 'part', to make a beautiful 'whole'. But in the early 1900s farms increasingly specialized. The whole was ignored and husbandry took a back seat to profitability.

Prior to 1920, the foremost names in queen breeding in the United States were in the North: Quinby and Doolittle in NY, C.C. Miller in Illinois, and Jay Smith in Indiana were considered preeminent. At around 1920, beekeeping, like the rest of agriculture, took a major turn. Beekeepers had the choice to pursue production and profits if they would abandon husbandry.

By husbandry here I'll refer to the definition given by farmer George Henderson in his classic work "The Farming Ladder." "One hears a lot about the rules of good husbandry; there is only one - leave the land far better than you found it. In the soil lies all that remains of the work of countless generations of the dead. We hold this sacred trust, to maintain the fertility and pass it on unimpaired to the unborn generations to come."

In beekeeping this translates to making sure to pass on maximum genetic diversity and breed for hardy, resilient, and productive honey bees. But in the 1920s, Northern beekeepers realized that it would be more profitable if they discontinued making up winter losses by drawing from their own surviving colonies and, instead, purchased replacements from the Deep South or from California. Thus package bee beekeeping quickly came to prominence. Queen production also shifted to warm climates. Beginning in around 1920 package bee and queen ads increasingly filled the pages of both *Gleanings in Bee Culture* and *American Bee Journal*.

In 1928, an article entitled "U.S. Bee Culture Laboratory Established in the South" appeared in the *American Bee Journal*. It begins "A new bee culture field station known as the Southern States Bee Culture Field Laboratory, has been established by the United States Department of Agriculture at Baton Rouge, LA." The article goes on to explain that "plans for the future work of the laboratory are now being made, and one of the first matters to be considered is the advisability of having United States Standards for packaged bees and queens."

All of this is indicative of the real paradigm shift that occurred. Both Southern and California beekeepers had always raised their own stock. Although their selection did not test for survival in long, cold Winters, they did select for a variety of traits indicative of overall health, among them wintering ability (albeit a rather short relatively mild Winter), honey production and disease resistance.



With a great dad, passing it on.

At the time of this paradigm shift however, selection increasingly shifted to one trait, brood production, in order to fill those packages.

I'll interject a small bit of my own history here as it's a part of all of our beekeeping history. I first studied bees in 1977 and had my first colonies in 1978. In 1980, I attended a daylong workshop at UC Davis offered by Dr. Norm Gary. The extension entomologist at the time was a young man named Eric Mussen. Eric had studied with Basil Furgala who was, I believe, the foremost authority on nosema in honey bees. After Dr. Furgala's passing I suggest that, up to the present time, Dr. Mussen holds that distinction. Eric dropped in, probably just to make an appearance as he was the state extension agent, and Dr. Gary directed several questions his way. In answer to one question regarding nosema, Eric stated flatly "If you want to have bees resistant to nosema, don't treat." Yet the practice then and for most queen producers to the present day is to treat prophylactically for nosema. Not much husbandry there.

When I knew I wanted to be a commercial beekeeper, I worked for one season for a commercial beekeeper. I was extremely fortunate to have worked for Rich Gannon's "Royal Air Force Apiaries." Rich had served as president of the California Bee Breeders Association as well as the California State Beekeepers Association. He was one smart, focused, and accomplished beekeeper. As we'd drive from one yard to another, I'd take advantage of the opportunity to ask LOTS of questions. Rich did once advise me that "Bob, sometimes it's better to keep your



Three happy customers.

mouth shut and appear ignorant, than to open your mouth and remove all doubt." To his probable chagrin, I just kept asking questions. Many of those questions pertained to queen selection. One of the answers to one of those questions was "We've selected for nothing but brood production and it has not served us well." Where has gone husbandry? It's been covered with dollar bills. Attention to husbandry and to methods that were entirely dependent on husbandry to succeed have been supplanted, the focus now only on profits. We've been raising bees that are like fragile race horses instead of resilient all around performers. And there has been a price. Honey bees consistently need more care (called 'inputs' by the accountants). They are more likely to need to be fed to get through Winter because they continue brood rearing when it's better for colony health for them to 'rest' from brood rearing. Maintaining brood when sufficient stores and good pollen are not available opens them up to stress induced diseases (nosema and various viruses for example). Largely, they have not been bred for resistance to the many pests and pathogens they're challenged by; instead they're 'treated' for same. And in almost every case the treatments create their own set of problems.

Contrary to some claims, there's plentiful genetic diversity in our U.S. honey bee population. A study by the USDA-ARS Baton Rouge honey bee lab (Bourgeois, Sylvester, Danka, Rinderer), published in the Journal of Apicultural Research in 2008 (1) examined genetic diversity just within a subset of commercial beekeeping operations. Even within this limited sampling their data suggested "that genetic diversity among commercial operations in both the USA and Italy is relatively high and that inbreeding depression is not an immediate concern."

Another study undertaken by Seeley, Tarpy, Griffin, Carcione, and Delaney, published in *Apidologie and Bee World* in 2015(2), examined the persistence of a largely closed population of feral colonies in New York /state. (Similar pockets have been identified, and more likely persist throughout the United States.) The persistence alone of such a population for over 30 years suggests that there's not likely a problem of viability due to 'genetic bottleneck'. The following is the abstract of this study, included because it's interesting and valuable information, it suggests ways forward, and, to me at least, it's inspiring.

"There is widespread belief that wild colonies of European honey bees have been eradicated in Europe and North America, killed by viruses spread by the introduced ectoparasitic mite, *Varroa destructor*. In reality, however, several populations of wild colonies of honey bees in Europe and North America are persisting despite exposure to *Varroa*. To help understand how this is happening, we tested whether the bees in one of these populations of wild colonies – those living in and around the Arnot Forest (NY, USA) – are genetically distinct from the bees in the nearest managed colonies. We found that the Arnot Forest honey bees are genetically distinct from the honey bees in the two apiaries within six km of the forest. Evidently, the population of Arnot Forest honey bees is not supported by a heavy influx of swarms from the nearest managed colonies, which implies that it is self-sustaining. These results suggest that if a closed population of honey bee colonies is allowed to live naturally, it will develop a

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Photo courtesy of Weltr Honey Farm, Keota, IA.

balanced relationship with it's agents of disease. Indeed, it is likely to become well adapted to it's local environment as a whole. We suggest four ways to modify beekeeping practices to help honey bees live in greater health."

I leave you with that 'teaser' and suggest you read the entire study yourself.

Unfortunately most of the selection of commercial stock has focused on turning them all into brooding race horses. There was a period around 2006, 2007, and 2008, when a systemic pesticide came to the fore and bee losses skyrocketed, that a significant segment of the industry briefly considered breeding more resilient stock. The financial incentive supplied by the almond industry, which wants broody colonies in the winter, coupled with government subsidies that support dead colonies rather than healthy ones, quickly snuffed out most of the interest in a more resilient stock among commercial apiarists. There's plenty of genetic diversity available; more commercial breeders could select differently. Fortunately there are still some breeders out there who select for much more than brood production. They have a real interest in health and resilience, in husbandry.

Because, I suppose, most everyone prefers to believe that they're doing the best they can for their communities, we're witness to some really mind boggling verbal and governmental gymnastics these days. Most of the subsidies whose stated purpose is to support beekeeping instead support poor management, poison agricultural practices (pesticides), and too often, the best liars. Farmers' efforts to minimize soil erosion with

other people's (taxpayers) money is called conservation. How can soil erosion be conservation? And those farmers eroding topsoil think of themselves as conservers? (Note: in the last 100 years the U.S. has lost 1/4-1/3 of its topsoil.)

We've created and live in a money world. The money wolves are always out there, and they're always hungry. We all need to eat, and to varying degrees we're all part of the problem. I can spout off here but come Summer I'll be spouting carbon monoxide as I drive from beeyard to beeyard. I guess maybe we all need to think hard about how beautiful husbandry is, how wonderful enough really is, rather than constantly looking for more. There are some positive trends. There are more farmers each year now, with husbandry foremost in their management. Today, I'm convinced more people are seeing the virtue of enough and are willing to support others who live by husbandry, with enough in mind. And we all make lots of choices every day.

March 1987. Driving East on the Nord Highway. Broken, grassy plain. About a mile from Route 99 the wild flowers start. Thicker and thicker. By the time we get to the beeyard it's a riot of color and form. Mention this to Rich. "We've had a beeyard here for 50 years Bob." What a beautiful thing to pass on. **BC**

Bob Brachmann is a commercial beekeeper and Russian breeder living in Western New York.

1. Journal of Apicultural Research 47(2):93-98
2. 2015 Apidologie 46:654-666

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“Hello, Dr. Bryant could I visit your lab this weekend and learn how to identify my honey samples by examining the pollen contents?”

Unfortunately, I get these types of emails and telephone calls fairly regularly. The problem is not my unwillingness to spend time with beekeepers wanting to learn how to examine pollen; the problem is that a weekend visit is totally inadequate for learning this complex type of analysis. I usually respond to these enquires with a positive reply offering to work with them if they wish, but adding that “I have been doing this for over 40 years and I am just now getting good at it!” That replay usually discourages most of the callers, but not all of them. The diehard ones insist on coming anyway and after several days discover that what I told them was true; one cannot learn to do this adequately in a weekend, a month, or even a year. To analyze honey samples using the pollen contents requires a “long learning curve!” This is not to say that it is impossible for a beekeeper to learn how to do this, but most of those who want to do it do not have the needed botanical background, the equipment to do the extraction process, or the pollen reference collections needed to help them identify the potential thousands of pollen types they could find in their samples. Nevertheless, there have been a few successes.

A retired biology teacher and an active member of a beekeeping group decided that he and his fellow beekeepers wanted to develop a guide to the pollen types typically found in honey produced in the Southeastern United States. They were very enthusiastic, very committed, and eager to learn how to complete this task. I worked with this group for over two years helping them learn how to collect and then prepare pollen reference material, how to identify and document the plants they believed were the primary nectar and pollen contributors in their region, how to extract the pollen from their honey samples, and how to photograph the pollen and prepare the pictures in a format that could be developed into an atlas of pollen types for their region. They had access to the equipment they needed and were permitted to use the microscopes and camera equipment in the biology department of a local junior college.

The group began with great resolve. Members collected, photographed, and reported the local abundance and distribution of what they believed were the key nectar and pollen producing plants in their region. They learned to extract the pollen from the flowers, made adequate photographs of the pollen, learned to describe the morphology of those pollen types, and began to develop the pages for an atlas of pollen types. They made great progress the first year but by the second year they were contacting me less and less and by the end of the year they decided their project was just too much work so they abandoned it after collecting information on about 25 different plants. Unfortunately, this example stems from a common problem; interested beekeepers and groups who want to do this often begin with great enthusiasm but soon find the task overwhelming and far too time-consuming, which then leads to an abandonment of their goals.

More recently, an individual in West Virginia, using grant money from the state’s agricultural program has begun the task of identifying the key pollen resources collected by honey bees in his region. He is a beekeeper with extensive botanical experience and has worked with his fellow beekeepers on a system to collect pollen pellets from beehives in a methodical manner during different times of the year. He then sends those samples to our lab where we process the pellets and return the extracted pollen to him to analyze. We have also sent him reference materials, pollen keys, and assisted in the identification of many pollen types to ensure that what he is reporting is an accurate reflection of the true pollen types that were collected. He completed the first year of this project, produced an excellent report of his findings and has now applied for additional grant funding to continue and expand his efforts during the coming year. Of all the previous beekeepers who wanted to learn how to do this or learn how to examine the pollen in honey, this person is the best example of a success story. Thus far he has followed through on his commitment and has been willing to spend the enormous amount of time it has taken to collect the samples, then learn the pollen types, and finally to do the analysis of each

Searching For Pollen In Honey

It’s Not As Easy As You Think!

Vaughn Bryant
Texas A&M



Vaughn Bryant examining a honey sample – the pollen is lily.

collected group of pollen pellets. His first year’s report is excellent and will serve as a valuable resource for local beekeepers. It will also serve as a guide to which plants the bees favor for pollen collection and can be used as a guide to encourage others to plant more of those key plant types for bees to use.

The more I work with beekeepers, producers, and honey importers the more I discover that there is growing interest in learning how to identify the sources of pollen and nectar

needed to help honey bees survive and hopefully help to stem the problem of colony collapse. As many scientists have reported, healthy bees seem to be able to weather many of the problems that can cause colony collapse. In spite of this growing awareness and interest, there seems to be few efforts to expand pollen studies or the honey analyses that are needed.

I began examining honey samples in 1975, when asked by the Office of the Inspector General of the USDA to assist them in determining the origin and floral contents of honey they were buying as part of the United States Farm Loan Act of 1916. That law established a “floor price” for many agricultural products, including honey, below which the Federal Government would not allow products to be sold within the United States. This was an attempt to stabilize food costs and provide farmer’s with a guaranteed price for their goods. Thus, beekeepers and honey producers

were guaranteed that they could sell their honey for at least the “floor price” set by the USDA. This policy worked effectively and was governed by the Federal Farm Loan Board. The problem arose when the world price for an agricultural product, such as honey, fell below the floor price set by the Farm Loan Board. At that point, beekeepers would have to sell their honey on the world market for a loss unless the beekeeper could “lend” their honey to the Farm Loan Board at the established floor price and then use the money to pay their bills. Later, the beekeeper could request the return of their honey provided the loan was repaid to the Farm Loan Board, including a modest amount of interest. That often occurred when

the world price for honey rose above the floor price meaning the retrieved honey could now be sold on the open market for a higher profit.

That system worked effectively for decades until the early 1970s when the world price for honey began to decline and finally reached levels below the U.S. established floor price set by the Farm Loan Board. The result was a flood of requests by U.S. beekeepers to lend their honey to the Farm Loan Board for the agreed floor price rather than being forced to sell their honey on the open market at a loss. By the mid-1970s the amount



Vaughn Bryant diluting honey to process it.

of honey being stored by the U.S. government as part of loans made by the Farm Loan Board Banks increased by several hundred percent annually, which caused government agents to become suspicious that not all of the honey they were storing met the criteria of being “domestically produced within the U.S.” That is where I came into the picture. I am a palynologist, someone who studies pollen, and pollen in honey is the primary method used to identify the origin of honey and also the floral nectar sources.

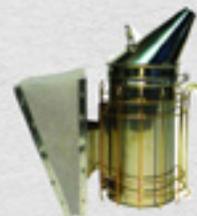
There are very few scientists in the U.S. who examine pollen and during the 1970s most of those who did work with pollen were employed by the petroleum industry because

pollen trapped in ancient deposits can be used as guides to the presence of plant materials that were later compressed and changed into natural gas and oil deposits. Therefore, the USDA had great difficulty trying to find anyone willing to examine their stored honey since the pollen analysts working in industry had no desire or time to pursue that task. The USDA admitted I was their last hope because others had turned them down. They hoped that because I was one of the few palynologists working in academia on modern, rather than ancient pollen records I might be

willing to help them. The authorities explained their problem and asked if I would help them determine if the honey they were purchasing was indeed “domestic” honey rather than illegal foreign honey purchased at cheaper prices and then “re-labeled” as being domestic to qualify for the higher floor price set by the loan

program. I had never looked at a honey sample but I guessed it would not be difficult since I had recently graduated from The University of Texas with a doctorate in botany and a specialization in the study of pollen. For \$50/sample, which was a lot of money in 1975, I agreed to examine 100 honey samples selected by the USDA from their honey storage repositories. Looking back, I now realize that I was totally naïve about the diversity of pollen and nectar sources available for honey bees within the United State. According to recent botanical records, worldwide there are over 352,000 angiosperms (flowering plants) from which honey bees can collect pollen and/or nectar. Of that total about 17,000

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species are native to the United States. An estimated additional 3,800+ ornamental flowering plants have been introduced into the U.S., not counting hundreds or maybe thousands of additional species of introduced agricultural plants, and new plant species continue to be introduced into the U.S. annually.

As a graduate student I had examined many types of archaeological, lake, bog, and other types of deposits to extract and analyze the trapped and fossil types of pollen. I suspect that by the time I completed my studies I could recognize several hundred pollen types by sight and could guess the identity of several hundred more. That, I very soon discovered was totally inadequate for looking at any honey sample. In those first 100 honey samples I received there were hundreds of new pollen types I had never seen before; it was pollen collected by honey bees foraging on plants in the many different floristic zones within the United States. That was my first major problem, but not the only one. I quickly realized that I also had to learn the pollen types of plants in other world regions so I could determine if a honey sample was domestic to the U.S. or originated in a foreign region, which would make it illegal for the loan program. After looking at a few of the honey samples I wanted to send them all back to the USDA telling them it was an impossible task, especially for \$50/sample. However, my pride prevented me from giving up and the challenge to do something nobody else in the U.S. was willing to do, made me determined to solve my pollen identification problem. I spent the summer of 1975, working harder than I had ever worked as a graduate student learning hundreds of new pollen types from the few published pollen atlases available, from published journal and book reports of honey studies conducted in Europe and other countries, and from collecting flowers and expanding my modern pollen reference database of microscope slides. Today, I estimate that I may have earned about 10 cents an hour for my honey work that first Summer. However, by the end of the Summer of 1975, I had greatly expanded my pollen database and I was able to provide some fairly accurate estimates about which

honey samples were produced in the U.S. and which were not. The USDA decided to continue that honey identification program for the next four years until the world market price for honey greatly exceeded the established floor price set by the Farm Loan Board. After that, the USDA lost interest in trying to identify honey and they have never again asked me or anyone else to examine more honey samples. By the early 1980s I had gained a much better knowledge of honey samples and I had greatly expanded my pollen database, but of the 17,000 plus pollen types in the U.S. I still only knew a few hundred by sight and could only guess about the rest, which I tried to track down and identify by searching in published sources or by sending pictures to other palynologists in hopes they might know the unknown pollen type. Unfortunately, since nobody else in the U.S. was working with honey, those other palynologists were rarely much help with the unknown pollen types.

The world of people doing palynology is very limited and thus most of us know who the others are who also work in the field. Because of my close association with U.S. palynologists working in the Petroleum Industry I not only knew what they were doing but I also benefited from many of their research ideas and insights about pollen extraction from various matrix materials, and about pollen production and preservation. After all, industry had all the funding and resources they needed since pollen played a key role in improving their recovery of gas and oil, and thus increased their profits. Twice, I was offered a job doing pollen work for one of the petroleum companies at

more than triple the salary I earned in academia; however, I enjoy teaching and doing pollen research, both of which I would have had to give up if I left academia, so I never did. One benefit, however, was that when EXXON and Mobil Oil merged they had two pollen reference collections. I encouraged them to donate one of them to our university, Texas A&M, which they did. Soon after that British Petroleum (BP) and the American Oil Company (AMOCO) merged and they also had two pollen reference collections, one of which I encouraged them to give to us. Thus, over the span of a decade our modern pollen reference collection expanded from about 2,000 taxa to over 20,000 types with a large emphasis and majority of those new pollen reference types coming from plants native to many non-North American regions such as Africa, Central and South America, and many areas of Asia. Those additional reference slides have enabled us to expand our pollen knowledge of many foreign regions and thus equipped us to be able to identify the geographical origins and nectar types of many honey samples imported into the U.S. by honey distributors and honey companies. It has also enabled us to be on the forefront of being able to search for and help identify the original origins of many illegally transshipped honey samples entering the U.S.

What began in 1975 as a favor to help the USDA and as a challenge to force me to expand my basic knowledge of pollen types from around the world has grown to become an almost overwhelming effort and at times a problem. From 1975 until the late 1990s my research focus turned to other types of pollen studies related to paleoenvironmental reconstructions, searching for the origins of agriculture, focusing on the identification of consumed pollen as guides to ancient human nutrition, food selection, and food preparation techniques; and exploring the use of pollen as trace evidence in forensics. After the late 1990s the illegal importation of honey, the beginning of illegal transshipping of honey, consumer concerns about the safety of purchased honey, and the beginning of a realization that there was no legal requirements for truth in labeling the types of commercial honey sold in stores led to a slow



increase in requests asking me to begin examining honey samples once again. By the beginning of the twenty-first century requests to our pollen lab to examine honey samples began to increase each year and by 2012, the flow of honey samples was becoming a fairly constant stream. That year I examined around 150 honey samples and each year after that the number of honey samples continued to increase until by 2016, it had reached over 300 samples. As 2017 begins, the flow of honey samples for analysis has already begun and there is no sign that the numbers are going to decrease anytime soon.

All of this discussion leads to two final questions: why do I examine honey and why am I the only one in the United States doing this on a regular basis? Let me answer the first question by saying that I consider the analysis of honey samples to be the greatest research challenge any pollen analyst could ever face. If one can learn to examine and identify the pollen in honey samples it will provide the background that person can use to conduct almost any other type of pollen research and it provides the type of background one needs to use pollen in forensic applications. To do most archaeological pollen analyses, especially in areas of North America, one might never need to know or recognize more than 100-200 pollen types. Using pollen to examine ancient North American deposits in lakes and bogs in order to record and reconstruct vegetation changes through time might require only a slight expansion of the 200 pollen type limit. However, to examine honey samples even from a small region of the United States requires a vast expansion of a person's basic pollen database of knowledge. In my published study of the analysis of 37 honey samples collected from hives in a few counties in East Texas my co-worker and I found those few samples contained over 431 different pollen species! That small East Texas honey study required us to know and recognize more pollen types than is required to analyze either archaeological or paleoenvironmental pollen studies from deposits anywhere in North America. Now expand that limited study of 37 honey samples collected from one small geographical area to

include not only the rest of Texas but also the entire United States with it more than 20,000 potential bee foraging plant types. I suspect you can now begin to appreciate the potential task one faces when trying to analyze honey samples. Add to that the need to know and recognize major pollen taxa from plants native to other regions of the world and the task begins to look enormous; remember, conservative estimates claim that worldwide there are over 352,000 plant species from which bees could collect either pollen or nectar.

Now to address the second question; why am I the only person doing honey analyses in the United States on a regular basis? The first reason is that there is a lack of specialists in the U.S. who have the background training, interest, and willingness to conduct pollen studies of honey. This is a serious problem because there is a need for more palynologists in the U.S. who could analyze honey and who could begin to identify key honey plants and honey types for each of the major regions of the U.S. What causes this problem relates to the academic training in U.S. colleges and universities; none of them teach how to identify pollen in honey or how to analyze honey using pollen technique. Pollen studies are offered in some U.S. universities, but those studies are in departments of geology, geography, anthropology, and occasionally biology, but none are in entomology. Academic centers in other regions of the world offer training in pollen studies of honey because it is considered an important national asset. Those countries also provide employment opportunities for those trained pollen specialists. This relates to the second problem in the U.S.; there is a lack of jobs for those trained to do pollen studies of honey. Because the U.S. has no legal requirements for truth in labeling honey samples, there are no large federal or state testing programs that would ensure that companies complied with truth in labeling requirements. Because the US has no required testing requirements, there is little need for experts who could test honey samples. Yes, there is some need as evidenced by the flood of samples I receive each year for analysis. However, the minimal fees we charge for examining those honey

samples would not be sufficient to provide full-time employment for highly-trained individuals. The final part of the answer to this question relates to funding. There is no major funding program at the federal, state, or even university level that would assist or encourage scientists to pursue pollen studies of honey. For the more than four decades I have worked here, my university has provided our pollen lab with free water and electricity, but that is all. Everything else that is needed to do our research, including honey studies, must come from outside funding. For example, we must depend on grant and contract funding earned from doing honey analyses, forensics for law enforcement agencies, archaeological studies, and paleoenvironmental reconstructions using pollen. Currently, our pollen lab charges a very modest fee for honey analyses, which barely covers the costs of chemicals, equipment, and minimal amounts of salary. If we raised our fees I doubt many individual beekeepers could afford to have their honey studied and I suspect even those who import and sell commercial honey might not be willing to continue their verification programs related to the honey they purchase and sell.

So where do we go from here? What is the future for pollen studies of honey and the studies of honey bee pollen pellets? Without federal, state, or local laws requiring truth in labeling we will continue to doubt what is really inside a jar of labeled honey or a packet of pollen pellets sold in stores. We won't be able to tell whether the honey we buy really is some premium type for which we are willing to pay a high price, or if instead the labeled premium honey might be some common and inexpensive type being passed off as a premium type.

That issue, related to the extensive problem centered on a lack of truth in labeling in the U.S. honey industry and deceptions about types of honey for sale throughout the U.S. will be the focus of my next article. I also plan to discuss related steps that some beekeepers and some states are doing on their own to police the problem, and steps being taken to regain consumer confidence by those who purchase honey for their own consumption. **BC**

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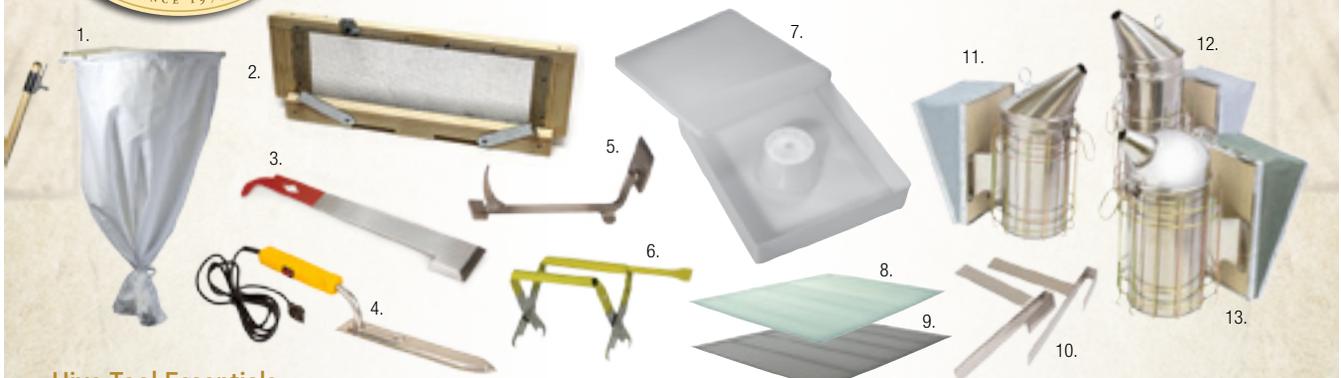


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A Closer LOOK

THE QUEEN'S COURT

Clarence Collison

Usually eight or more worker attendants are present when a queen is stationary, but they tend to lose contact as she walks rapidly over the comb.

The honey bee queen is typically surrounded by a small compact group of workers who are attending her. These young workers comprise her royal 'court' or 'retinue.' They face her, constantly examining her by antennal contact and licking her body surfaces. These attendants are responsible for feeding her royal jelly, grooming her, removing her excreted waste and obtaining and transferring pheromones. This court is only obvious when the queen is standing still on the comb and the attendants are caring for her. Usually eight or more worker attendants are present when a queen is stationary, but they tend to lose contact with her as she walks rapidly over the comb (Free 1987).

Adult queens are fed by workers of brood food producing age and presumably receive mostly royal jelly, possibly with some additional honey (Allen 1955, 1960; Haydak 1970). Within a colony, a queen rarely, if ever, feeds herself. The amount the queen is fed by adult workers in her court is related to the queen's egg laying rate. As the colony grows, the egg laying rate increases, and the queen is fed more often and for a longer duration (Chauvin 1956; Allen 1960). A queen will lay as few as two or as many as 26 eggs between feedings, and is generally fed by only one worker between each period of egg laying, although up to five workers in succession have been seen to feed queens (Allen 1955; Winston 1987).

The ages of the attendants of a honey bee queen, and the time spent feeding her, were observed (Allen 1955). The colony was in a three-frame observation hive, which resulted in the rate of egg-laying of the queen being restricted (mean 504 eggs per day). At first the mean number of feeds was 4.8 per hour, but after swarm preparations had commenced the number of feeds declined. Usually only one or two bees (maximum five) supplied the queen with food between each period of egg-laying. The egg-production between successive feeds was observed. The ages of the bees which examined the queen with their antennae varied between a few hours and 36 days. A smaller number of bees, from one to 30 days old, licked the queen. Bees from one to 11 days old fed the queen. The mean age of bees feeding the queen was significantly reduced after the construction of queen cells had started. The duration of each feed was 47 ± 2.6 seconds. There was no obvious relationship between the age of the workers and the duration of feeds.

Allen (1960) observed and marked 196 workers that were seen to examine the queen and the durations of their visits were recorded. All gradations of

behavior varying from an apparent desire to avoid the queen to a strong desire to remain with her were found. The behavior of individual bees varied on different visits, but no regular sequence was found. More than half of the total number of visits had a duration of 30 seconds or less while the remainder were longer than 30 seconds, with a maximum of 41 minutes. About eight per cent, of the visits were very short and terminated abruptly and with signs of alarm, but no reason for this type of behavior was apparent. The ages of the attendants varied from a few hours to 52 days but no obvious difference in age-distribution between the attendants remaining for very short periods and those remaining for longer periods was found. In relation to the total numbers of marked bees of different ages present, the proportion of workers acting as attendants showed no systematic variations, although in a colony where the average age was low (as in Summer) the actual numbers of young attendants would apparently greatly exceed those of the older ones. The age-range of attendants licking the queen was similar to the overall age-range of the attendants. The ages of the attendants feeding the queen in two colonies ranged from one day to 23 days. No bee was seen to feed the queen during the day of its emergence, although the greatest numbers recorded occurred in the next few days of adult life. No systematic changes were apparent in the duration of feeds given by

“The amount the queen is fed by adult workers in her court is related to the queen's egg laying rate.”

bees of different ages, the mean value for two colonies being 44 seconds. Observations made during the season of active brood-rearing up to swarming time (April-July) showed that the number and duration of feeds supplied to the queen tended to rise until two to three weeks before the swarm left but in this latter period both number and duration decreased, approximately from the time that queen cell formation started. Thus the queen received gradually diminishing quantities of food in the period of swarm preparation. Egg-production over the same period showed a similar trend. Queens typically lose weight when a colony is preparing to swarm so that they will be able to fly when the swarm leaves the hive (Morse et al. 1966).

The activity of a honey bee queen affected both the number of her attendants and the proportion licking her (Allen 1957). The mean number attending the queen in the summer was six while she was moving over the comb, eight when laying eggs, and 10 when stationary. During the Summer one out of 89 attendants licked the queen while she was moving, compared with one out of 24 while egg-laying and one out of nine when stationary. There was no appreciable change in the number of attendants after swarm preparations had started, or in the proportion of attendants licking and examining the queen. Less interest was shown in the queen during the Winter period, and at this time she was only occasionally licked.

Specific queen pheromones have been shown to be effective in several aspects of physiology and behavior of worker bees including her attractiveness and formation of the

“Pheromones from several glandular sources are involved in the formation of the queen’s court.”

court. The responses of workers to the queen change as the queen ages. De Hazen et al. (1989) developed several bioassays to test the attractiveness of Italian queens, parts of queens and pheromone extracts. After introducing a live intact queen or other test materials, observations of attendants were made every 15 minutes for several hours. When queen body parts were introduced into a hive or observation hive, the number of workers surrounding the head, thorax and abdomen were counted. Pheromone extracts were deposited on filter paper and after drying were placed in the hive and numbers of workers that antennated the filter papers were counted.

Observations on the effect of queen age on attractiveness demonstrated three levels of attractiveness. The older the queen, the more attractive she became. One-day-old queens attracted practically no workers. There was a jump in attractiveness for two-, three- and four-day-old queens. The highest level of attraction was attained in queens aged five days old and older with the attractiveness of five-day-old queens being equal to that of queens 18 months old. These observations were correlated with changes in mandibular gland ultrastructure (source of queen mandibular pheromone) (De Hazen et al. 1989).

The distribution of attending workers around the head, abdomen and thorax showed that the abdomen is more attractive than the head and the head is more attractive than the thorax. When the data are normalized by consideration of the exposed surface area of these body parts, the attractiveness per unit of surface area is greatest at the head. Mandibular gland extracts showed greater attraction than extracts of the abdominal tip or tergal (from the dorsal surface of the abdominal segments) secretions (De Hazen et al. 1989).

Queen honey bees are attractive to their workers, due partially to the pheromonal bouquet they secrete. Queen mandibular gland pheromone is a powerful attractant to worker honey bees but it is not solely responsible for eliciting retinue behavior. The attractiveness of virgin queen tergal gland secretions and queen mandibular pheromone to worker honey bees was tested using a retinue bioassay. The number of workers attending the treated pseudoqueen lures was videorecorded in order to allow for the quantification of attractiveness. Queen mandibular gland secretions were more attractive than tergal gland secretions and both queen tergal gland secretions and mandibular gland secretions were significantly more attractive than the control treatment. This laboratory bioassay indicates that queen tergal gland secretions have a releaser effect that evokes retinue behavior from worker honey bees (Wossler and Crewe 1999).

Pheromones from several glandular sources are involved in the formation of the queen’s court. The mandibular gland mixture (Queen Mandibular Pheromone, QMP) alone does not result in queen retinue behavior. A second source of pheromone (Queen Retinue Pheromone, QRP) serves to attract

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workers to her and to form the retinue around the queen (Caron and Connor 2013). Queen mandibular pheromone is composed of five active components: 9-oxo-2-decenoic acid (9-ODA), both enantiomers of 9-hydroxy-2-(E)-decenoic acid (9-HDA), methyl p-hydroxybenzoate (HOB) and 4-hydroxy-3-methoxyphenylethanol (HVA). Four additional chemical components have been identified from several glandular sources that account for the majority of the difference in retinue attraction between synthetic QMP and queen extract: methyl (Z)-octadec-9-enoate (methyl oleate), (E)-3-(4-hydroxy-3-methoxyphenyl)-prop-2-en-1-ol (coniferyl alcohol), hexadecan-1-ol and (Z9,Z12,Z15)-octadeca-9,12,15-trienoic acid (linolenic acid). These compounds were inactive alone or in combination, and they only elicited attraction in the presence of QMP. There was still unidentified activity remaining in the queen extract. The queen therefore produces a synergistic, multi-glandular pheromone blend of at least nine compounds for retinue attraction, the most complex pheromone blend known for inducing a single behavior in any organism (Keeling et al. 2003).

Observations provided strong circumstantial evidence that workers in a queen's court obtain queen pheromone on their antennae, and that queen pheromone is distributed through the colony during antennal contact between workers (Ferguson and Free 1980). Workers that had just left the court of a mated or virgin queen had an increased tendency to make reciprocated antennal contacts with other workers. This tendency was reinforced when the workers concerned licked the queen in addition to palpating her with their antennae, probably because they spent longer in the court. The first workers contacted by those leaving the court also had an increased tendency to make reciprocated antennal contacts. Antennal contacts were more likely to be initiated by bees other than those from the queen's court. Workers from the court and those they first contacted, participated in food transfer more than did workers selected at random. Workers that licked a virgin queen subsequently participated in food transfer more than those that palpated her with their antennae only. Within about five minutes of leaving the court, a worker's participation in reciprocated antennal contacts and in food transfer diminished to the level of non-court workers. Workers chosen at random made more transient and non-reciprocated antennal contacts when in a colony with a mated queen than when in a colony with a virgin queen.

Queen attendance behavior of workers from selected honey bee colonies with high and low worker retinue response to synthetic queen mandibular gland pheromone (QMP) was investigated. Antennating, licking, grooming, and feeding of the queen by workers from high and low responding colonies were examined. High and low QMP responding workers did not attend the queen differently. However, workers originating from different colonies antennated and licked the queen more frequently than others, suggesting

there may be a genetic basis for queen attendance behavior not necessarily associated with response to QMP. The median age of queen attendance was independent of strain (Pankiw et al. 1995).

A worker-queen contact in the retinue of the honey bee enables transfer of queen pheromones to workers. Behaviors of workers attending the queen and post-contact behaviors were recorded (Kralj and Bozic 2001). The most commonly observed activities of workers in retinue were licking and antennating the queen. Those activities were interrupted with bouts of self-grooming, which was the most frequently observed activity of licking attendants. Naumann (1991) showed that self-grooming results in the translocation of queen mandibular pheromone from the mouthparts and head to the abdomen of the workers. Immediately after leaving, the queen, workers which had licked the queen, self-groomed longer and more frequently than workers which had antennated the queen. Licking post-retinue workers walked significantly faster and rested less frequently than palpating post-retinue workers, which suggest that licking attendants are most effective in the pheromone transfer accomplished by accidental encounters with other nestmates (Kralj and Bozic 2001).

Honey bee queen attendants disperse queen pheromones to supplement pheromone dispersal by direct queen-worker contacts. With time they lose their dispersal

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function exponentially due mainly to volatilization of queen pheromones carried on their bodies. The elimination of those airborne pheromones together with the air while ventilating the hive is balanced by pheromone release by the queen. This equilibrium results in a certain level of queen pheromones in the brood nest. The change of the pheromone level (for example, due to colony loss of its queen) can serve as a signal to alter the behavior of the workers and the state of the colony (Juška et al. 1981).

A worker bee from a queenless group of workers shows a variety of behavior types when she encounters a queen. This consists of avoidance and aggression, offering food, feeding and retinue behavior and finally negligence. Although most changes of one behavior into another occur randomly, the overall pattern can be divided into an initial phase in which avoidance and aggression are frequently observed, a second phase characterized by feeding and retinue behavior and a final phase in which negligence of the queen dominates. When back into her group of queenless workers, this bee functions as a substitute queen by attracting the attention of the others, which show principally the same behavior types to her. This attractiveness of the substitute queen is due to mandibular gland substances from the queen, adhering to her body. Food exchange between the substitute queen and her attendants is mainly directed to the substitute queen. Feeding by the substitute queen is almost always related to the occurrence of aggression towards her. This is opposite to what might be expected when food exchange would be the mechanism by which information about the presence of the queen is distributed among colony members. When a queen is deprived of her mandibular glands she evokes the same behavior types in an encountered bee, but the frequency of negligence is higher, whereas feeding and retinue formation occur less frequently. When back in her group of workers this bee hardly functions as a substitute queen, since she is almost treated as an arbitrary bee. Both the attractiveness of the returned worker and the direction of food exchange indicate that sensory perception by means of the antennae

of queen mandibular pheromone on the body of the queen or the substitute queen plays a major part in the "queenright" behavior of the bees (Velthuis et al. 1972). **BC**

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ROYAL JELLY

A worker bee produced, protein rich, mother's milk

Stephanie Bruneau

Did anyone ever tell you 'you are what you eat'? There is no creature for which this is more true than the honey bee. Amazingly, queen bees are genetically exactly identical to worker bees. But they're fed a different diet from worker bees their whole lives, from the time they are tiny larvae, until the day they die. This different meal plan causes their physiology and behavior to develop completely differently from worker bees, despite the same genetic foundation. What is this magic food? It's not broccoli! It's the aptly named substance, royal jelly.

What is Royal Jelly?

Royal jelly is a protein-rich excretion from the glands of worker bees – I think of it as a honey bee's version of mother's milk. While all larvae are fed royal jelly for the first three days, of life, larvae chosen by the worker bees to become queens are bathed in royal jelly in special, elongated 'queen cells' throughout their development. After the larval stage is complete and the queen bee emerges, she is fed royal jelly throughout her life.

Queen bees are up to 1.5 times the size of worker bees, and live generations, are sexually mature (unlike worker bees who cannot mate), and have a totally different set of behaviors from the other bees in the hive. When a hive needs a new queen, it will select up to 10 larvae less than three days old, and begin feeding them royal jelly. The first queen to emerge will sting the

other developing queens through their cells, killing them before they can hatch. If two or more queens hatch at the same time, they will fight to the death!

About three to five days after emerging, on a sunny day with low wind, the new queen will take her 'nuptial flight'. She will find a 'drone congregation area' – a place where male (drone) bees from other hives hang out and wait for a queen, and over several days will mate with 12-20 drones in mid-air, gathering as much genetic material as she will need for her entire life (up to six million sperm!).

Back at the hive, the queen's main role is 'reproducer in chief.' She will control the size of the hive, laying more eggs in preparation for Spring and Summer, and slowing laying in preparation for the cooler months when there's less work to do and less food around. In the height of the Spring, the queen can lay up to 2,000+ eggs a day. This is more than her own body weight in eggs! The queen is always surrounded by a circle of devoted workers who feed her constantly and dispose of her waste. They also collect and distribute her queenly pheromones throughout the hive, letting all the hive's residents know that their queen is alive and well.

It's amazing to think that such a different set of abilities and behaviors can arise from the simple matter of food! It makes you want to take your vitamins, doesn't it? Or perhaps, just a nice healthy dinner, followed by a

good spoonful of royal jelly infused raw honey.

How do beekeepers harvest royal jelly?

It is no wonder that royal jelly is an expensive product, as its production is a painstaking process that requires close attention and precise timing. First, a beekeeper creates a small colony of bees with no queen. She ensures that this small colony has many young bees that will work as nurse bees in the hive. Next, she inserts fake queen cups into this colony (several rows of plastic or wax cups that are the right size for bees to build queen cells on), each cup containing a honey bee egg, hand grafted into each cup. Instinctively, the workers will start raising queens for their colony, using the eggs and queen cups provided. The nurse bees will fill the cups with royal jelly. At the perfect moment (usually between the second and fourth day of larval development), the beekeeper will remove the royal jelly from the queen cups with a small suction tool. If she is too early or too late, there won't be enough royal jelly to harvest. Working in this way, a beekeeper can harvest ~500g (~17 ounces) of royal jelly per hive in a season.

How has Royal Jelly been used throughout history?

In cultures around the world, royal jelly has been used to promote a healthy and long life. Because it's such a precious substance (so little is made, and it's not easy to harvest), historical use was mostly for royalty, just like in the honey bee hive. In traditional Chinese medicine, royal jelly is called "food of the emperors", and has long been prescribed to lengthen life, promote energy and vitality, and prevent illness. Royal jelly has also been used by the maharajas of India, who have long valued the substance as a key to maintaining youthful energy. In ancient Egypt, royal jelly was given to the pharaohs, promoting their longevity. More recently, Pope Pius XII (1876-1958) was prescribed royal jelly from his physician to help him recover from a severe illness. Princess Diana (1961-1997) was documented to have used royal jelly throughout her pregnancy to help with morning sickness, and Queen Elizabeth (currently in her nineties) uses royal jelly regularly to "stave off fatigue".

Today, royal jelly is used by more than royalty. China is recognized as the world's largest producer and exporter of royal jelly, with an estimated annual production of between 400-500 tons. Almost all of the exports are to Japan, Europe and the USA. Korea, Taiwan and Japan are also important producers and exporters. Price is ~\$100/kg in bulk, but can be much higher in a processed form (such as tablets, capsules or vials) where one kg could cost the consumer as much as \$3,300.

Royal jelly for nutrition, health and wellness

Royal jelly is a nutrient rich liquid. It is roughly 66% water, 13% protein, 15% carbohydrate, 5% fatty acids, and 1% trace elements. It contains all the B vitamins, and traces of vitamin C. Royal jelly also contains collagen (the major protein in our skin, hair, nails, bones, and veins), and several antioxidant enzymes.

Today, royal jelly is sold widely as a nutritional supplement, although this is perhaps a mis-



Queen and workers. (Graham Burns photo)

categorization as it is taken in such small amounts (~250-500mg at a time) that to use it as a source of dietary nutrients doesn't really make sense. Rather, it is more often used for its ability to act as a stimulant or 'wellness boost'.

Royal Jelly and Stamina

As the current Queen of England attests, many of the royal jelly supplements sold today tout its ability to boost endurance and combat fatigue and stress. A 2001 Japanese study bolstered these claims, finding that the endurance of mice increased when they were fed fresh royal jelly.

Royal Jelly and Cholesterol

In addition to boosting energy, several studies have found royal jelly to be cardioprotective, lowering blood pressure and reducing LDL or "bad" cholesterol. A 1995 study found that just .1 grams of royal jelly (dry weight) decreased cholesterol by 14 percent.



Mint Tea. (Graham Burns photo)

Royal Jelly and Immunity

Leigh Broadhurst, Ph.D., a USDA researcher, postures that just like mother's milk helps to boost the immunity of newborn mammals, royal jelly provides this service to the immune system of a honey bee colony. Royal jelly has also been found to be highly antimicrobial, effective against yeast and bacteria. A 1995 study conducted in Egypt demonstrated that royal jelly was capable of killing several different kinds of bacteria, including *Staphylococcus aureus* and *E. coli*.

Royal Jelly and Fertility

The well-known children's author Roald Dahl wrote a short story titled 'Royal Jelly' where a beekeeper boosts his fertility and the health of the eventual baby by secretly supplementing the family's food with royal jelly from his hives. And, in fact, it's not just fiction – Royal jelly's effects on reproductivity have been validated scientifically in animal studies – perhaps because of its ability to balance hormones, or it's ability to boost overall wellness and nutrition. In three different studies, rabbits fed a royal jelly supplement had increased fertility; quail reached sexual maturity faster and laid more eggs, and chickens had increased egg production.

Royal Jelly and Skin Care

Royal jelly has also been used cosmetically. It contains the protein collagen – what many think of as the key to youthful looking skin. Wrinkles form when our skin loses its collagen. In cosmetics, royal jelly is used to promote skin elasticity, regrowth and rejuvenation. It's also used in shampoos and conditioners, and increasingly so! While formerly a specialty product, you can now find shampoo with royal jelly at Walmart, Target, Rite Aid, CVS, and in many other common retail outlets.

There is still a lot to be learned about royal jelly – while there are many benefits attributed to royal jelly from personal anecdotes, there hasn't been as much scientific validation as there has been with other bee products. This could be, perhaps, that there is less available funding for high quality research. Most of the research that does exist comes out of Asia, as it is used more regularly there than in the U.S. Still, there are many personal testimonies to the benefits of royal jelly in many civilizations throughout time – from today's England's royal family to Chinese emperors, centuries past.

RECIPES

Royal jelly is a perishable product, and purchasing a professionally processed product is recommended. The best way to purchase it is in freeze-dried capsule form, or mixed with raw honey, which acts as a natural preservative. If you do purchase it fresh, we recommend that you purchase it frozen (don't purchase royal jelly that has been stored or shipped at room temperature). The recipes included below call for royal jelly mixed with honey – we purchase a version of royal jelly in honey where every 1 tsp contains 675 mg of royal jelly.

As with all bee products, test a small sample first to make sure you're not allergic.

Royal Jelly 'Fudge'

4 TBSP royal jelly & raw honey mix
4 TBSP melted unrefined coconut oil
3 TBSP raw cacao powder
2-3 TBSP nut butter

Combine all ingredients until well mixed. Pour the mixture into a small pan lined with waxed paper, or evenly into a silicone ice cube tray. Freeze until solid and cut into 12 even pieces. Store in the freezer to keep solid.

Royal Jelly & Honey Mint Tea

With the caffeine in the green tea and the energy boost from the royal jelly and raw honey, this refreshing drink should kickstart your day or give you a nice afternoon boost. I like it best iced.

4 cups of water
a big handful fresh mint
1 TBSP royal jelly in honey
2 bags of organic green tea
fresh lemon or lime

Bring water, tea bags and mint to a boil in a saucepan. Simmer for five to 10 minutes or until the minty flavor you want is achieved. Take it off the heat, strain out the mint leaves and tea bags, and stir in the royal jelly honey. Add lemon/lime juice to taste. Serve hot, or chill in the refrigerator and serve over ice (with a citrus wedge and a sprig of mint if you're feeling fancy!).

Iron-Woman Smoothie

Whether you are iron deficient or looking for an energy boost to power you through your upcoming race, this richly spiced smoothie will help. Royal jelly increases oxygen uptake, boosting endurance and stamina. Royal jelly also helps with anemia, which women are twice as likely to suffer from than men.

1 cup almond milk
1 tsp blackstrap molasses (more or less to taste – it can be quite strong!)
1/4 tsp ground cinnamon
1/4 tsp ground ginger
1/2 tsp vanilla extract
1 frozen banana
1-2 tsp royal jelly mixed with honey
a few ice cubes

Mix all ingredients together in a blender. Depending upon your desired thickness, use more or less milk to get the consistency you like. **BC**

Stephanie is a passionate beekeeper, mom, herbalist, artist and author. Her upcoming book, The Benevolent Bee, focuses on capturing the bounty of the honey beehive through science, history, home remedies and craft. The Benevolent Bee will be published by Quarry Books in July 2017, and includes recipes and techniques for honey, beeswax, propolis, royal jelly, pollen and bee venom.

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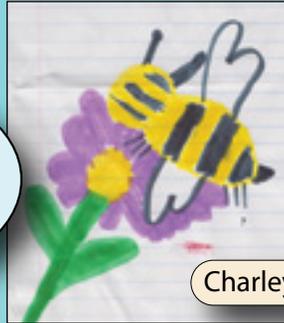
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Bee B. Queen Challenge

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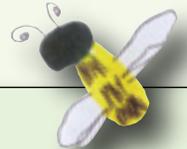


Photo: Mark Wieland

Honey Bee, Write Poetry

Bees and gardens have inspired poets to write verse for centuries. Allow your creative expression to flourish by writing free verse or by following these simple poetic forms.

Bee daring. Bee brave. Pen to paper a poem to save.



Get in the Mood. Sit in a quiet space outside next to a beehive, garden, or field. Take a moment to drink in the scene, scents, and sounds. Write a list of words to describe your thoughts, feelings, and visual and auditory observations.

Diamante

Use this form as a starting off point for a poem. Antonym Diamante is a seven line poem using two opposite words at the beginning and end with the middle lines referring to those words. A synonym diamante uses two nouns that mean basically the same thing. Some possible words: summer and winter, head and abdomen, nectar and honey, pollination and seeds

Line 1: one noun

Line 2: two adjectives that describe the top word.

Line 3: three verbs ending in "-ing" that describe the top word.

Line 4: four nouns: the first two related to the top word and the last two relating to the bottom word.

Line 5: three verbs ending in "-ing" that describe the bottom word.

Line 6: two adjectives that describe the bottom word.

Line 7: one noun.

Workers

Industrious, Beneficial

Flying, Cleaning, Feeding

Community of sisters, Brothers in theory

Roaming, Drifting, Eating

Easy-going, Carefree

Drones

Haiku

Haiku is a short form of Japanese poetry that often is inspired by nature. The structure relies on the rhythm of words using five syllables in the first line, seven syllables in the second and five syllables in the third.

Bright blossoms blooming,
Pollen and nectar laden,
Waiting for visiting bees.



Acrostic Poem

Choose a word to be your poem's topic. Write each letter in a column. Use each letter as the beginning of a line of poetry about that topic. Here is a poem by Kim Lehman using the word honey:

Happy bee
On a sunflower
Notices me
Eyeing her every move
Yearning for the sweetness to come.



... BEE kid's CORNER

Produced by Kim Lehman - www.kim.lehman.com

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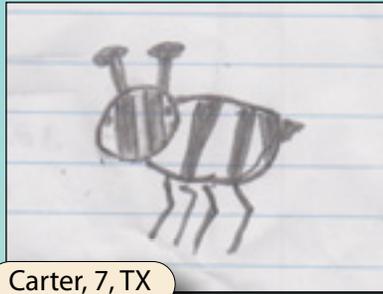
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Riddles

Yoceph Cunningham, age 10 from Virginia shared some riddles with us.

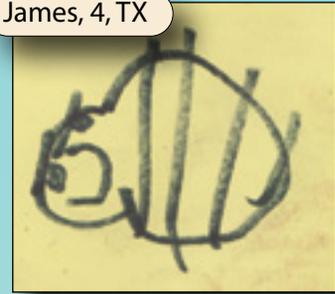
What kind of bee can't make up it's mind?
A maybe.

Why do bees have sticky hair?
Because they use honey combs.



Carter, 7, TX

James, 4, TX



Share Your Poetry

- Send your poem to be printed in the newsletter of a beekeeping or garden club.
- Take a photograph or paint a picture to complement your poem. Make a greeting card to send to friends.
- Put your poem to music to create a song.
- Have a honey bee poetry reading at your house. Invite friends to write and share a poem about bees,

"B" Bee Word Search

Can you think of ways in which these words relate to honey bees? Find and circle each word.

- BABY
- BATIK
- BEANS
- BEAR
- BEE
- BENEFICIAL
- BIOLOGY
- BLACKBERRY
- BLOSSOMS
- BUG
- BUILDERS
- BUZZING

K	B	B	T	D	L	F	B	H	Y	T	B	W	J	Y
M	I	U	L	C	V	H	J	R	U	X	U	X	J	M
B	E	T	G	O	Z	Y	R	W	Y	Z	I	G	N	U
I	Q	D	A	B	S	E	N	C	R	L	L	O	W	B
E	C	G	C	B	B	S	X	U	C	A	D	Y	F	X
A	P	C	B	K	G	E	O	Z	Y	I	E	B	N	C
H	D	R	C	M	Y	B	M	M	N	C	R	A	R	O
B	E	A	N	S	T	A	L	K	S	I	S	B	F	R
X	L	S	A	M	P	B	P	T	B	F	P	M	A	P
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K	W	V	T	Z	U	W	T	R	J	N	B	J	U	A
Z	Q	X	Z	J	B	F	V	X	D	E	L	E	U	P
U	F	I	Y	G	O	L	O	I	B	B	E	E	Y	Y
R	N	D	T	Z	L	J	I	K	U	R	X	T	A	L
G	I	H	A	R	E	N	G	Q	T	Q	V	J	L	K

The answer is somewhere in this magazine.

Bee Buddy

Mari Burnham, age 10, began working with bees about a year ago. It all began with her grandfather's friend Steve Kramer, a local beekeeper looking to pass on his love of bees. Now everyone Mari talks with about bees wants to learn more. Mari

finds many things fascinating about bees. "I think it's pretty cool that they can fly so far away and still find their way back. There are so many bees in the hive and everyone has a job to do." In her free time Mari swims on a team, enjoys baking and is learning Spanish at a dual immersion academy.



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Blue Blossoms For Honey Bees

Blue Flowers – Fascinating to Gardeners and Good for Bees

Janet Davis



Siberian squill (*Scilla sibirica*). Bulb.

There's something about shimmering blue flowers that fascinates gardeners – in fact some love them so much that they devote a special section in their garden to blue flowers only. While that might be a little somber for you and me (blue flowers, after all, tend to recede in our vision compared to bright yellows and reds), a blue-flowered garden can be a supermarket for honey bees, provided the right plants are grown in quantity and in sequence throughout the foraging season, so there's always something in bloom. Quantity is important, of course, because honey bees practise economy-of-scale in their foraging trips; they need a sufficient population of each preferred nectar- or pollen-rich plant to make a visit worthwhile. Unlike bumble bees and other native bees, honey bees are 'flower-faithful' or

'flower-constant', as Charles Darwin wrote, learning the intricacies of the anthers or nectaries, then working on one type of flower until its pollen or nectar is depleted. So if you have a small garden, choose just a few from the list below, but plant lots of them. And, of course, avoid the use of insecticides and herbicides.

Here are 17 excellent blue-flowered honey bee plants arranged sequentially from Spring to Fall.

Spring:

1. Siberian squill – *Scilla sibirica* (Hardy Bulb)

This little bulb is so hardy and aggressive, it tends to naturalize over the years into large carpets of azure-blue in early Spring, even in lawns where the foliage can be left to ripen to nurture the bulbs for next year before being mown. That habit and its abundant bright-blue pollen on flowers just a few inches tall makes it a buzzing place on a sunny, warm day in April or May, not just with honey bees but with lots of natives, especially plasterer bees. Plant scilla bulbs in Autumn, when you would normally plant tulips and daffodils, in a sunny location at a depth two

to three times as deep as the height of the bulb itself. (USDA Zone 2-8)

2. Lungwort – *Pulmonaria sp.* (Perennial)

A tough, hardy group of beautiful perennials for early Spring, the funnel-shaped blossoms of the various lungworts are a good source of nectar for bees. Lungwort prefers a lightly-shaded site with reasonably moist, humus-rich soil and grows to approximately 12 inches high and 18-24 inches wide. When conditions are favorable, lungworts will self-seed and even cross with each other, making large colonies. Good blue-flowered selections are 'Blue Ensign', 'Trevi Fountain' and 'Munstead Blue'. (USDA Zone 4-8)

3. Grape hyacinth – *Muscari armeniacum* (Hardy Bulb)

Being grape-scented, rather than being a true hyacinth, is what gives this little Spring bulb its common name. Its nodding, white-edged, cobalt-blue flowers clustered on stems about six to eight inches tall are an excellent early source of



Lungwort (*Pulmonaria sp.*). Perennial.



Grape hyacinth (*Muscari armeniacum*). Bulb.



Forget-me-not. (*Myosotis sylvatica*). Biennial

Mountaintanana).

nectar and white pollen for honey bees. Grape hyacinths flower at the same time as forget-me-nots, below, and they pair well together. Plant the small bulbs in Autumn at about twice the depth of the bulb's height. And don't worry if you see leaves emerging in Autumn; that is a perfectly normal trait of Spring-flowering muscari. (USDA Zone 4-8)

4. Forget-me-not – *Myosotis sylvatica* (Biennial)

This species is biennial, meaning it makes leaves the first year, then flowers, sets seed and dies in the second season. So abundant is the seed that, once planted, you'll never forget it – thus its common name. It is a good source of nectar over a long period in Spring, and exhibits an interesting reproduction strategy. Once the tiny flowers have been pollinated, the fleshy five-part yellow ring at the center, which acts as a nectar guide, loses its yellow carotene pigment and turns off-white, signalling to the bees that nectar is no longer being produced. (USDA Zone 3-9)

5. Mountain bluet, perennial cornflower – *Centaurea montana* (Perennial)

All centaurea species – the knapweeds, cornflowers (including annual blue cornflower, *C. cyanus*), and weedy star thistles – are good sources of nectar and pollen for honey bees, but old-fashioned mountain bluet is a lovely addition to the late Spring-early Summer perennial garden. Bushy plants bear shaggy blue blossoms on two-foot



Mountain bluet. (*Centaurea montana*). Perennial.



California Lilac. (*Ceanothus 'Dark Star'*). Shrub.

stems, and repeat-flowering can be encouraged by deadheading spent blooms. Mountain bluet spreads by rhizomes and self-seeds readily and is considered invasive in some regions. (USDA Zone 3-9)

6. California lilac – *Ceanothus* sp. (Shrub)

Where they're hardy, the dazzling, blue flowers of California lilac shrubs are bee magnets in Spring. The hardiest species and hybrids, including 'Dark Star', pictured, 'Skylark', 'Wheeler Canyon' and 'Henri Desfosse' should survive Winter provided temperatures do not go lower than 15°F (-9°C). Grow California lilac in rich, well-drained soil in full sun, choosing a protected, south-facing spot in cooler regions. (USDA Zone 7-10)

Early-Mid Summer:

7. Meadow sage – *Salvia nemorosa* and *Salvia x sylvestris* (Perennial)

Most of the sages (*Salvia* species) are good bee plants, but meadow sage and its hybrids come in lovely blues and deep-purples that look beautiful with iris, peony, lupine, catmint and other early-Summer perennials. Meadow sage prefers well-drained, average soil in full sun. Excellent blue varieties include 'Blue Hill' ('Blauhagel'), pictured, 'May Night' ('Mainacht') and 'Caradonna', all reaching 18-24 inches. (USDA Zone 4-8)

8. Catmint – *Nepeta* sp. (Perennial)

Long-blooming and an excellent source of nectar for honey bees and bumble bees, catmint is easily-grown in well-drained, average soil in full



Meadow sage. (*Salvia x sylvestris* 'blue Hill'). Perennial



Catmint. (*Nepeta* 'Blue Wonder'). Perennial.

sun. Its aromatic foliage makes it highly deer-resistant. Catmint is often used in herb gardens, along with other bee-friendly herbs like oregano, thyme and holy basil. If cut back after their early Summer flowering, it will usually re-bloom in late Summer. Excellent choices are *Nepeta racemosa* 'Walker's Low' and 'Blue Wonder', pictured, both about 18-24 inches tall and 18 inches wide. (USDA Zone 4-8)

9. Veronica – *Veronica* sp. (Perennial)

Many veronica species or speedwells are good sources of nectar and pollen, and popular with honey bees and bumble bees. Two of the best are early Summer's *Veronica spicata* (one to two feet) and the taller, slightly later-flowering



Veronica. (*Veronica longifolia*).
Perennial.

Veronica longifolia (three feet). With their lovely, blue flower spikes, both are well-behaved additions to the perennial border, long-lived, hardy and easy to grow in full sun and average soil. (USDA Zone 4-8)



Hyssop (*Hyssopus officinalis*).
Subshrub.

10. Hyssop – *Hyssopus officinalis* (Subshrub)

Grown as a medicinal herb since antiquity, hyssop is native to eastern Europe and central Asia but is recorded as having arrived in North America in 1631 with the first colonists. It provides excellent forage for honey bees and bumble bees, and produces a fragrant, rich honey. In Bulgaria, one hectare of hyssop grown as a nectar crop can produce 150-175 pounds of honey. Drought-tolerant, it likes full sun and flowers from mid to late Summer. In milder climates, hyssop is evergreen;



Love-in-a-mist. (*Nigella damascena*).
Annual.

in cold regions, it dies back in Winter. Depending on the variety, hyssop grows between one to two feet tall, and should be sheared back after flowering to maintain a tidy shape. (Note that this is different from a plant often called anise hyssop, *Agastache foeniculum*.) (USDA Zone 3-10)

11. Love-in-a-mist – *Nigella damascena* (Annual)

Every garden can use a few annuals, and love-in-a-mist is one that is easily grown from seed broadcast in a sunny spot in average soil in early Spring, as soon as the ground can be worked. Love-in-a-mist adds charm to mixed plantings, where it is considered a ‘filler’ plant. The ‘mist’ part comes from the thread-like leaves that surround the flower, whose pollen-rich anthers attract honey bees and complex nectaries provide nectar. Plants grow 12-18 inches tall and the seed pods are lovely in dried arrangements.

12. Borage – *Borago officinalis* (Annual)

Bees adore borage, a mainstay of European herb gardens since medieval monks grew it in their apothecary plots. It is fun to watch honey bees hovering near one of the down-facing, blue (or pink) flowers before clinging to it briefly to gather nectar or pollen. Borage is grown as a commercial crop in North America for the omega-6 fatty acid GLA (gamma-linolenic acid) contained in the oil of its seeds, and hives brought in by local beekeepers have been shown to increase pollination of the flowers. Borage has been grown as a monofloral honey crop, including in Italy, where ‘miele di borragine’ is a delectable honey. Borage is easily grown from seed in constantly-moist

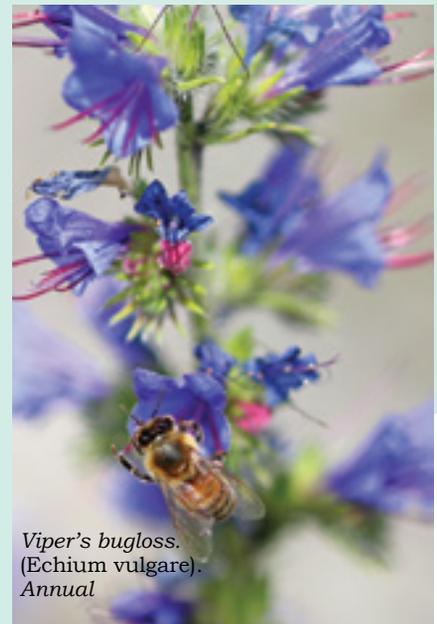


Borage. (*Borago officinalis*).
Annual.

average soil in sun or light shade, and will readily self-seed. It’s perfect for a vegetable or herb garden or waste places, but a little coarse for a flower border.

13. Viper’s bugloss, Blueweed – *Echium vulgare* (Biennial or short-lived Perennial)

Imagine a plant that grows wild in the gravel alongside our highways or in dry fields as being the source of a flavorful, light-amber, slightly lemony, monofloral honey. That would be viper’s bugloss or blueweed, native to Europe and temperate Asia, but a common weed throughout much of North America, where its azure-blue flowers are manna for honey bees and bumble bees. Viper’s bugloss reaches two to three feet in height and flowers from late June to August. (USDA Zone 3-8)



Viper’s bugloss. (*Echium vulgare*).
Annual

14. Chicory – *Cichorium intybus* (Perennial)

Another widespread roadside weed that attracts honey bees and all kinds of native bees with its sky-blue flowers is chicory. Native to Europe but naturalized throughout the world, chicory has long been grown



Chicory.
(*Cichorium
intybus*).
Perennial/
Weed.

as an edible, with the ground-up, roasted roots of one form used as a coffee substitute, and the somewhat bitter Spring leaves of other forms harvested for culinary use. It's also grown as a forage crop in certain regions. But for bees, the value in chicory is in the sky-blue flowers loaded with abundant white pollen. While it's not recommended that you plant chicory (it's on the noxious weed list of a number of states), if it's growing wild near your hives, it will prove to be a good source of Summer pollen. Grows to four to five feet and prefers dry, infertile soil. (USDA Zone 3-9)

Mid Summer-Autumn:

15. Globe thistle – *Echinops* sp. (Perennial)

Bumble bees and honey bees can often be found sharing the spherical, mid-late Summer flowers of globe thistle. Among the most commonly available species are *Echinops ritro* (the dwarf variety 'Veitch's Variety' is shown here) and *E. bannaticus*. Although globe thistle is not thought of as a large-scale honey crop, its potential for honey production has been well researched in Poland. Depending on the species, globe thistle will reach three to six feet in well-drained, adequately moist soil



Globe thistle. *Echinops ritro* 'Veitch's Blue'.

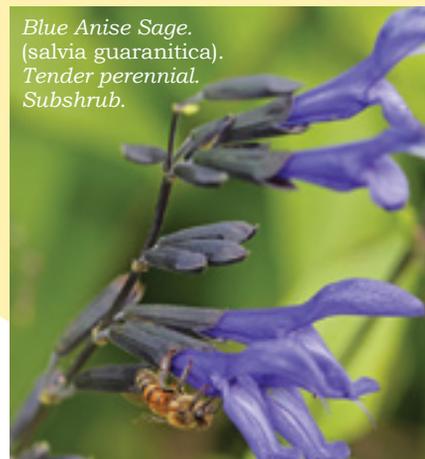
in full sun. It makes a good garden partner to Russian sage, below. (USDA Zone 3-9)

16. Blue anise or hummingbird sage – *Salvia guaranitica* (Tender Perennial, Subshrub)

Though blue anise sage, native to South America, is traditionally known for the hummingbirds it attracts to its trumpet-shaped flowers, it is also a popular bee plant – even if honey bees must acquire the plant's abundant nectar through nectar robbery, probing the corolla tube through holes made by the stronger proboscises of bumble bees or carpenter bees. The cultivar 'Black and Blue' is particularly beautiful, commonly available, and a good tropical plant for the late Summer garden. Plant it out in rich soil in a sunny spot when the soil is warm and all danger of frost is past and watch it reach four feet by mid-Summer. (USDA Zone 8-10)

17. Russian sage – *Perovskia atriplicifolia* (Subshrub)

This large, shrubby plant with aromatic grey-blue foliage from the steppes of Afghanistan (not Russia) bears wands of small, lavender-blue flowers for a long period from



Blue Anise Sage.
(*salvia guaranitica*).
Tender perennial.
Subshrub.

mid-Summer into Autumn. Honey bees and bumble bees are regular visitors for nectar. Though listed as a perennial (it was the 1995 Perennial Plant Association plant of the year), it is technically a subshrub, having woody stems that die back in varying degrees each Winter. That's important because it should not be cut back at the end of the gardening season, as with other perennials, but left unpruned until Spring when temperatures have moderated and new growth is showing. Russian sage

grows best in full sun and average, well-drained soil, reaching a height of three feet and a width of four to five feet. (USDA Zone 3-9)

18. Blue mist bush – *Caryopteris x clandonensis* (Subshrub)

One of the last shrubs to bloom in the garden, usually in September-October along with asters and goldenrod, blue mist bush (aka blue



Russian Sage.
(*Perovskia
atriplicifolia*).
Perennial

with honey bees and bumble bees at a time when nectar flow is subsiding. Native to east Asia, the species itself is beautiful but there are a few exceptional cultivars, including 'Dark Knight' with deeper blue flowers and 'Summer Sorbet' with gold-variegated leaves. Although the roots are hardy to Zone 5, top growth of *caryopteris* is hardy only to Zone 7, therefore plants in Zones 5-6 should be mulched well in Winter. Winter-killed branches can be cut back to the ground in Spring to encourage vigorous new growth from the base. (USDA Zone 5-9) **BC**

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BIGGER PICTURE

Jessica Louque

Spring Seeds, Part 2 – High Mowing Seeds

As mentioned in some of my previous articles, High Mowing Seeds is another of my favorite seed companies and definitely one of my go-tos for Spring planting. My particular favorites are their Shanghai Pac Choy, Burgundy Okra, and the wide selection of beans, including soybeans! As a reference, for Christmas 2016, I ordered from High Mowing to add to our “Garden Present” that Bobby and I get each year. From High Mowing, we bought the Shanghai Pac Choy, Burgundy Okra, Blackeye Cowpea, Calypso Dry Bean, Eclipse Dry Bean, Jacob’s Cattle Dry Bean, Light Red Kidney bean, Vermont Cranberry dry bean, Black Jet soybean, Shirofumi soybean, Chiba Green soybean, and the Midori Giant soybean. We’ve had a lot of success with some of these in the past, particularly the soybeans. We’re trying out some of the dry beans for the first time this year and will see how they go. Phacelia is a great bee forage, but it just does not grow well at our house. It could be that most garbage and/or rocks have more organic matter than our soil, but hopefully it’s getting a little better each year.

I would also like to point out here that the pac choy has excellent flavor and it’s a smaller variety so it makes a fantastic stir-fry with beef tips and teriyaki sauce. As a bonus, they also sell a napa cabbage that goes well with the pac choy stir-fry if you pair it with pork. Throw in some soba (buckwheat) noodles and soy sauce and you’re good to go! As a bonus of favorite companies, if you’re interested in small-batch food, The Bourbon Barrel in Lexington, Kentucky has some of the best soy sauce I’ve ever eaten, and their Kentuckyaki is a great teriyaki sauce to use in stir-fry.

For my “preferred” seed vendors, I have the following qualifications: reasonable prices, organic options, lots of varieties available, good

germination rates, and personable customer service. On my quest to cover my favorite seed companies, I’ve sent out requests for information of the company, its background, and a description of whatever plants/seeds they would like to highlight. I also didn’t ask for a bee-related preference since I know a lot of you guys are gardeners for produce as well as bee forage. High Mowing was more than willing to provide some information on their company, and gave me a variety of their favorite offerings with some gorgeous photos. If you do plan to purchase from High Mowing Seeds this year, please try a few of their “NEW for 2017” options and let me know how they grow in your specific area. At the end of the article, you will find information for purchasing seeds online or by calling to order. There is also an option to find a dealer that sells High Mowing Seeds near you (if it’s available) so you don’t have to order. I hope you readers are able to take advantage of their company and order some of their great seeds!

High Mowing Organic Seeds Company Bio

High Mowing Organic Seeds began in 1996 with just 28 varieties, many of which originated in founder Tom Stearns’ backyard. Today we offer over 600 heirloom, open-pollinated and hybrid varieties of vegetable, herb and flower seed, and grow several of our offerings on our very own production farm in Wolcott, Vermont.

High Mowing believes in promoting healthy environments, healthy economies, healthy communities and healthy bodies through organic seed production and land stewardship. We work to provide an essential component in the rebuilding of a healthy food system: the seeds.

Our small and dedicated staff is passionate about food and farming. Some of us run our own farms. Some

of us have farmed in the past. We are a fun-loving group with diverse interests, brought together by our common love of growing.

Poona Kheera Cucumber · Heirloom

Unusual gourmet variety with sweet golden skin and juicy, crisp texture. Specialty variety from India has light yellow skin when young, with rosy russeting at full maturity. Traditionally sold at yellow stage, but flavor is best when harvested as rosy blush begins. Heavy producer. Climbs easily on a trellis to 5-6’. Small flowers attract pollinators, especially ground bees.



Green Wave Mustard Greens · Open-pollinated

Bright lime green, ruffled leaves add great contrast to salad mixes. A reliable workhorse mustard, with beautiful color and spicy flavor that mellows when cooked. At baby stage leaves are flat with softly serrated edges. At full size, leaf margins become heavily serrated and frilly. Leave plants in the ground to flower post-harvest to attract pollinators.



Hale's Best Melon • Heirloom

Heavy producer of oval-shaped fruits with old-fashioned juicy flavor. Heavily netted and slightly ribbed with juicy salmon flesh. This great variety has stood the test of time and is still loved by many for its classic muskmelon flavor. Thin rinds do not hold up well to shipping. Developed in 1920 by a Japanese farmer in California. Flowers attract pollinators, especially ground bees.



Picnic Pepper Collection • Open-pollinated • NEW for 2017!

Now a snack pepper mix developed with open-pollinated varieties! The Picnic Pepper collection includes a single 10 seed packet of each of the Picnic Pepper varieties. The collection when compared to market standard snack peppers in trials has consistently performed well or better than the hybrids. We've especially selected our set for their rich, sweet flavor and we hope you agree they taste better than most any other pepper you'll try! Flowering plants will attract pollinators.



Benning's Green Tint Summer Squash • Heirloom

Easy-to-grow pale green fruits that mature to a creamy white. Bushy plants provide good yields of saucer-shaped fruits with scalloped edges. No formally noted virus resistance, but has shown field resistance in our trials. Flowers attract pollinators, especially ground bees.



Garlic Chives • Open-pollinated • Perennial

Similar to standard chives with delicate garlic flavor. White, star-shaped flowers are long-lasting, ornamentally beautiful and unique. Plants grow more slowly than standard chives and are slightly less hardy. Makes for a great addition to salads and a delicious garnish on most dishes. Prolific blooms are attractive to bees.



Bouquet Dill • Open-pollinated • Annual

The most widely-grown organic dill for fresh eating, flowers and seed heads. A versatile, early-maturing variety used for fresh leaves, seed head production and cut flowers. Produces seed heads well ahead of others and right in time for Summer pickles. Flowering umbels average 6" wide. Flowering plants produce plenty of pollen for bees and butterflies.



Thyme • Open-pollinated • Perennial

Tiny aromatic leaves cover slender woody stalks ending in sweet white flowers. Makes a beautiful low-growing border along herb and flower beds, growing only 6-10" high. A versatile culinary staple. Our strain is hardy to Zone 4. Flowers are excellent forage for pollinators.



Double-Click Cosmos Blend • Open-pollinated • Annual • NEW for 2017!

The cosmos you could confuse with a dahlia! Blend of fully double and semi-double flowers share the many-shaded pinks of Sensation Blend, but have the layered petals of an aster or dahlia. Hardy, tolerant of drought and low fertility, subject to very little disease or pest pressure, this cosmos blend is much easier to grow than either of its look-alikes. Open habit attracts many pollinators.



Black Beauty Poppy · Open-pollinated · Re-seeding annual · NEW for 2017!

The poppy that looks like a gorgeous peony! We had universal agreement amongst a tough audience that this flower had to be in our catalog. Between the double flowers and the dark velvety burgundy color, Black Beauty is a stunning eye-catcher unlike any poppy you've ever seen. And like all poppies it's easy to grow, needs minimal care, and will re-seed itself. Open habit attracts many pollinators.



Evening Colors Sunflower Blend · Open-pollinated · Annual

Each plant carries an amazing variety of gold and pale yellow flowers with dusty rose to pink rings. An unusual genetic mix with few solid colors and chocolatey brown centers. Well-branched; stems average 18" long with single heads. Great for bouquets and provides a long season of color! Attracts bees and butterflies.



Phacelia Cover Crop · Open-pollinated · Annual · NEW for 2017!

The blossom no self-respecting pollinator can resist! Highly attractive to honey bees, bumblebees, and syrphid flies, whose larva are voracious feeders on aphids and young caterpillars. Phacelia is widely adaptable and tolerates drought better than most, but requires dark and a little cool for good germination, so bury seed at least ¼ inch deep. Often grown together with buckwheat, which acts as a nurse crop for the slower germinating phacelia. Once established, the phacelia will take over the planting and flower over a long season. But a word of caution - don't put in a big planting too close to a crop you need pollinated as you'll draw off all your worker bees!



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Beeyard Thoughts, Observations, and Updates

*Talking and writing about bees –
modern beekeeping minefields, and
comments on dealing with old frames.*

Talking and writing about bees – cursed either way

Every month, I get several beekeeping magazines. Sometimes these publications accumulate after only being quickly reviewed. At other times, I read every word. I always enjoy the read and have enjoyed it for many years. Bee publications literally litter my life. But, regardless of the amount of attention that I devote to a particular monthly magazine, I usually get a pained, slightly uncomfortable feeling as I put the publication aside.

“Wow – great article with great graphics!” “Well . . . I had not thought of that – and I should have.” “Why do my photos never look this good?” “I wish I could voice an opinion that cleanly.” Even when I pick up new information or new techniques, I still have a small, distant darkish feeling that I should be doing more, learning more, and staying more updated.

Yet, it is even a bit worse. For all of us senior citizen *“white hairs”* who spout, *“Well, when I was a young bee boy about 107 years ago, that is not how we did it. You should have been keeping bees then!”* This sage beekeeping attitude will not always carry the day. Beekeeping should not be trapped in the past.

Many of the new writers that I read today are intelligent, well read, and usually brimming with confidence and opinion. I envy them. In my defense, many years ago, it was much easier to professionally communicate about bees (or maybe I was just brimming with confidence and opinion). The old/wise card plays out very quickly.

Today’s audience, either live or virtual, has access to a vast, vast

amount of information on all aspects of beekeeping and the philosophy of life. New beekeepers are not the clean slate that they were decades ago. It is very easy for any professional bee communicator to get tripped up when addressing eclectic modern beekeeping groups.

For example

Several years ago, a knowledgeable beekeeper wrote me after having read a piece I did on smokers and smoker fuels. Within the article, I commented that, “I wished someone could develop a better system than just primitively smoking a bee colony” (and everything else surrounding the colony).

I went on to mention that pine needles (*pine straw*) for those in the Southeastern U.S. is a common fuel. It ignites easily, puts out a cool white smoke, and is readily available. It also burns fast and requires frequent recharging. I commented that such smoke residue clings to everything. The beekeeper, the vehicle, the storage shed – all smell of pine smoke. Actually, nearly any other smoker fuel leaves such an odor.

The writer explained, in a concise chemical way, that pine needles contained several resinous byproducts that are inhaled when we burn it in our smokers. As a smoke alternative, other (apparently) safer fuels, such as wheat straw, were suggested by the writer.

At the 2017 Winter New Jersey Beekeepers’ Association meeting, I said that oxalic acid sublimated fumes should not be inhaled (*this is true*), but neither should bee smoker smoke be casually inhaled (*this is true*). I went on to say that due to its

resinous components; pine needle smoke should especially not be used as smoker fuel (*to an extent, this is true, too*). It was an uneventful moment, and I moved on.

Later in the day, as I strolled by the equipment vendors, I noticed that one of the vendors had bags of pine needles for sale at their equipment table. (*Drat!*) I had stepped on a small bee mine. To that NJ vendor, let me add this caveat. Through all the bee years, untold amounts of pine needles have been burned as smoker fuel. Obviously, the diagnosis of *“death due to pine needle smoke”* from a bee smoker is non-existent. Was I suggesting that while standing on mats of readily available fuel, beekeepers in pine-growing areas should search for another fuel? Not at all. Essentially no smoke fumes are good for us or our bees, particularly pine smoke. But for most of us, the exposure is (apparently) slight, and we should simply use the least amount possible. I was correct, but it was a *small* correct assertion.

To the vendor in NJ, I apologize. My assertion was too powerful, and if I use it again, I will soften it.

For Example (#2)

At a recent meeting, I extemporaneously said that beekeepers had changed in recent decades. I colorfully said that they no longer come to bee meetings wearing bib overalls and driving a tractor. Of course, I later noticed that an accomplished and educated beekeeper, whom I have known for many years, was sitting right there with bib overalls sans tractor. (*Drat!*) I meant that as a colorful analogy and was not even aware of



what the beekeeper was wearing. To that beekeeper, I apologize. I hope it was patently obvious that I was not referring to him in that context.

For Example (#3)

A couple of years ago, I was an eager bird feeder. I enticed a host of interesting bird species and about 9,000 house sparrows. Then the squirrels came. Then the skunks and raccoons started the night shift at my feeder buffet. It became a veritable wild kingdom. All I had wanted was some yellow finches, some Rose-Breasted Grosbeaks, and rarely, a few Pine Siskins. Yet, here I had this menagerie of wildlife.

The skunks particularly went wild. At one time, I had six to eight skunks living under my small storage shed. Of course, they found my hives. I had a real imbroglio ongoing. I had skunks running wild, but not very wild, for they were not really fearful of me. Later while trying to relocate a raccoon that had been harassing my colonies, I got a skunk instead.

At a subsequent meeting a week later, I (humorously, I thought) said that, *"If you have a skunk in a live trap, you have no friends – anywhere!"* Immediately, an individual in the audience stood to reprimand me for *"skunk mistreatment."* She said the skunks were there first, and I moved in on top of them when my house was built. She was forceful in her beliefs (Drat!). I had a notion that this woman did not have six to eight skunks within 50 feet of her back door with six grandkids, two dogs, and a cat.

I had no idea that there were skunk-loving people and groups within this country. I stopped feeding birds. Now I have very few skunks, raccoons or birds.

It may not be what's said or written, but rather what is NOT said or written

In this bold, restructured bee world, it is not always what is said during a presentation or written in a published article – its what you didn't say.

I recently returned from a nine-day "bee talking" trip. I presented nine times so I can't recall the particular meeting where a beekeeper came to me and directly asked the question, *"Why do you never write about top bar hives?"* Did I sense that he could

A needy frame tossed onto the wood pile. What should have been done with this frame?



have been braced for an argument?

I am not opposed to TBHs in any way, but I have not used them in many years. I built three many years ago and stocked them here in OH. As they died out (something not unique to TBHs), I did not replace them.

My main experience was with East African transitional top bar hives in Uganda and Kenya. Then later, I worked with Africans who were part of my program. At this point, I don't have a strong interest in them – so I have not written much about them. I have every intention of restocking them one day.

My point?

I could go on, but hope that I have made myself clear. Nothing is wrong with today's beekeeping informational systems. Indeed, the mechanisms keep beekeeping diversified and evolving. As a presenter or writer, one has to take greater care when speaking casually or professionally than speakers did many years ago. The average beekeeper is now much better informed and has frequently formed solid opinions based on the available information – sometimes even before becoming a beekeeper. Be prepared to discuss all points and recommendations in depth.

What do you do with old frames?

Is this what you do with old frames? This one was tossed onto the woodpile. I only had one that was in dire need and at the moment, I was engrossed in beehive work. Maybe later in the season, but "later" has yet to come.

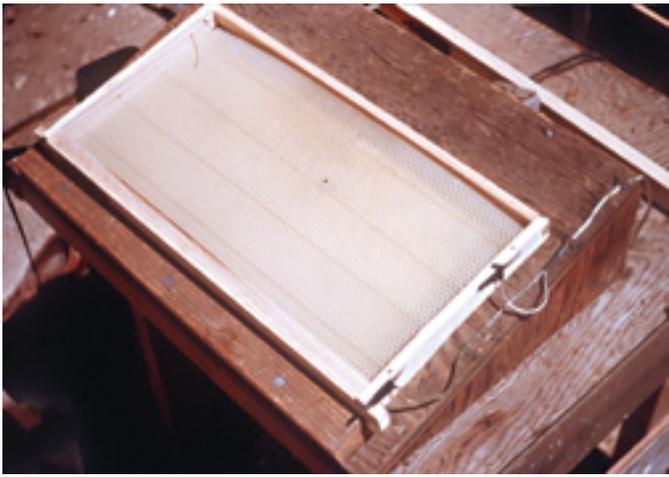
It would be easy to hate these failed things. They take up space, they require tedious labor to repair, and they attract mice and insects in storage. Many are still wooden, but increasingly, many of these needy frames are made of plastic. Essentially, each of these frames signifies a failed effort on both my and my bees' part. Maybe that is why the task is distasteful.

Unless you are of a personality who enjoys the frame repair process, I would (reluctantly) recommend using plastic sheet foundation (inserts) for repairing wooden frames – even those that had been wired. Much like a wheat penny, wired frames are yielding to newer types of frame and frame assembly. Most wired frames would be very old frames. Common sense dictates if the antique is even worth repairing.

I did not look at every supply catalogs, but I found it surprisingly easy to find all the necessary replacement parts to completely

What are you going to do with the destroyed wired frame? It needs lots of love.





A frame with foundation with wiring about to be embedded. Note that the foundation is in a frame having both top and bottom pieces without grooves. The foundation is held in place only by the wiring.

rebuild a traditionally wired frame or even assemble new wired frames. I would have thought that these assembly products would be fading away. I'm happy they are still here. Could I ask if any of you still nail, wire, and embed wax foundation in wooden frames? And if you do, would you tell me why you still do that? Obviously, there is absolutely nothing wrong that that option. I refer to this process as *traditional frame construction*.

Whatever it takes

In articles past, I have tediously described how to partially disassemble a failed wooden frame in preparation for reassembly. I'll not go through that again. If you have an interest in repairing a wooden frame, you already have a pretty good idea of what the task will require. Use a heat gun to melt residual wax and propolis. Have cutter pliers handy. A light hammer, frame nails, and a fresh bottle of wood glue are required. A table saw is great for cutting new wedges for the top bar. Alternatively, if not destroyed or rotted, just use the broken wedge and nail/glue back into place.



Frame with wired foundation being inserted into the hive.



Organize a Frame Repair party. See what fun this is! (Photo from unknown origin)

A common challenge

You, the frame repairer, can count on challenges when retrofitting a different style of foundation into a frame that was not originally intended for that foundation type. Improvise, but I hope you don't get sloppy. Use snips to cut plastic inserts to fit. If replacement foundation is too small, tack it in place with frame nails or whatever else you can contrive. Once the bees have the refurbished frame and are on a good nectar flow, they will generally cover over all your improvised repaired areas.

A new common challenge

Plastic frames require more repair finesse. Forget gluing various hurt parts and spots. The propolis and wax will make glue use impossible. If the frame lugs are broken, repair parts are available that will replace them. This small metal piece was developed for wooden frames, but I suspect it could be screwed to a broken plastic frame that needs a lug repair.

Jimmy C., an AL beekeeper, says he takes unusable plastic frames, puts them in a large container and

waits for the wax moths to find them. After they have broken down as much comb as possible, Jimmy uses a pressure washer to clear as much of the remaining debris as possible. After drying, he lightly coats the (mostly) cleared frame with bees wax and reuses the frame. I can see where that would work. I have used a pressure washer to refurbish wooden frames. You will need to solidly clamp the frame to something or it will be blown to the next county. Additionally, the repair person should expect to be wet from the ears down – but the frame will be clean.

End note . . .

I very incorrectly assumed that wired foundation was rapidly being replaced by anything plastic. So – I should make a video of the process before it is lost to beekeepers everywhere. I took a look at the video storage sites just to be sure. I'm glad I did, it would appear that, in fact, most beekeepers must have made a video on how to wire frames and embed the wiring.

I have essentially moved to plastic and can readily say that there are traditional issues with both plastic frames and plastic inserts – but they are so fast to put together. For the second time, I would like to ask you how many of you are still using wooden, wired frames, and why? I know this frame is stouter and more stable, but do you have other reasons.

Thanks for reading . . . Jim **BC**

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What You Don't Know *CAN* Hurt You

Keeping Records

Denise **Ohio** and Catherine **Minden**

Beekeeping is a multisensory experience. You don't just see the bees, you listen to them, you breathe in the scent of the hive: a mix of honey, propolis, and wood so strong you can taste it. You feel a bee walking on you or the sharp burn of a sting. It's hot in a bee suit and veil, hair tickles your nose when you already need to sneeze, and sneezing inside the veil is a special experience. Beekeeping is so glamorous.

This is part of why keeping bees is wonderful and why it's easy to resent anything that gets in the way of that experience. Like record keeping.

Everyone talks about the importance of records, and we all know we're supposed to do it. But record keeping is a challenge. It's not clear what to track, how, or when. There's a lot of possible data to gather, and it's a pain to gather quickly, especially when you're wearing a bee suit and gloves. And because it's a pain and a nuisance, many people just don't bother to do it.

But keeping records is a concrete way of tracking what you've done and what you've tried. It gives you a picture of your hives at a specific time as well as helps you see long-term patterns in queen productivity, disease outbreaks, and treatment effectiveness. Keeping records also allows you to be directed in your tasks. We all need to get into and out of the hive as quickly as possible. A quick review of your notes from a previous visit helps you get what you need to get done with minimal disruption.

Let's say you're committed to keeping records and you have the best of intentions. But how do you tackle this

beast? As with most things, start by figuring out what your goals are. What information you track, how, and how often are all determined by what you need to help you achieve your goals. Perhaps this season you want to

- Test a new hive configuration or a new piece of equipment
- Produce more honey, beeswax, pollen, or nucs and queens
- Try a new location
- Expand your apiary

Whatever your goals are, ask yourself what you need to know to see if you're getting there.

It's easy to make grand plans to keep highly detailed, high-tech records when it's winter and you're sitting in a comfy chair, sipping cocoa and wearing bunny slippers. It's a different story when it's 94° in the beeyard and you're sweating like people you read about in books. So as you think about what you absolutely need to know, also think about *when* you need to know it. For example, do you need weather data? Possibly yes, if you're trying to figure out why a queen is underperforming and want to know if it was raining when she was ready for her mating flight, but you can get that from numerous websites when necessary. So do you need to record that info during every routine hive inspection? Probably not.

The idea here is to separate the data you *could* capture from the data you *need* to capture to get information that will help you help your bees.

Designing your plan of attack

Your approach to tracking hive activities doesn't have to be complicated. Perhaps you just need a memory aid to help you remember what you have to do after an inspection. One beekeeper we know changes the positions of the bricks atop his hives to cue him about what's going on inside. Another makes notes on duct tape on the top cover with a Sharpie.

While these methods are easy and don't require expensive equipment – and some record keeping is better than none – they don't give you much information over time. For example, how do these beekeepers prepare for the next hive inspection if the information about the last visit is in the beeyard? How do they compare what happened last season with this season? How do they track where they got their queens or when they treated for *Varroa* and with what? How do they remember which



hive is the one with the frame that needs to be replaced?

The two biggest record-keeping issues are accuracy and timeliness. The information needs to be complete and recorded as close to real time as is practicable. (“Principles of Record-Keeping Practices” from the Canadian Food Inspection Agency website has many helpful suggestions.) “Real-time” and “accurate” are closely related. To keep real-time records requires tools that are easy to use, inexpensive, robust, and flexible enough to use on-site and that yield the results accurate enough to be useful.

We use a simple worksheet that we fill out during hive inspections. This is the information that helps us remember the status and day-to-day needs of a specific hive and helps us see patterns and changes over time. We keep a tight lid on what we track because anything that isn’t useful just gets in the way.

There are other worksheets available that you can find online (some are free and some you have to pay for). If they work for you, great. If not, figure out why not. Maybe a slight change would make them useful. Again, keep your goals in mind. The point is to gather what you need to know, when you need to know it, so you can see if you’re meeting your goals. See the sidebar, “Information is power,” for more.

Taking it high-tech

Some people swear that the best way to manage your record keeping is with an app. There are several available, with some by paid subscription. Many use cloud services to retain your data, so you can access the app and your data through any Internet-enabled device, which could be handy if you want to use such a device while working your bees.

A few things about these tools give us pause. First, if you can’t access the Internet or don’t have a cell signal in the yard, you may be out of luck. Several apps allow for offline use, but not all, so if your yard is out of range, the app won’t work. Also, some of these apps upload to the cloud whether you want to or not, and if you have limited data, you may incur fees.

Second, using apps in the field is messy. Literally. Take out a cell phone or other touch-enabled device and watch as it’s splattered with beeswax, pollen, nectar, and propolis. Trying to use a cell phone, much less a tablet, while working bees is clumsy. You’re holding a frame with a hive tool in one hand while the other hand is trying to thumb-tap notes on a sticky screen. Of course, you can wait until after you’ve finished your inspection to enter the data while still in the yard, but while nitrile gloves work fine on a Samsung Galaxy’s touch screen, crud-covered leather gloves don’t. You’d have to take them off to get the app in the beeyard to work and who has time for that?

And when you inevitably drop the device, better hope it doesn’t land in the middle of a full-to-bursting honey frame. (On the other hand, while you may have to deal with a record-setting level of stickiness, your phone will taste better than any cell phone on the planet. Just don’t be licking it in public because people will take video and post it on YouTube. While Internet fame sounds fun, do you really want to be known internationally as the Phone Licker?)

That said, apps could be useful in our apiary in the future, with a little further refinement and the ability to customize easily. One feature we’ll suggest to developers

now is support for speech-to-text conversion with audio prompts. That way, you could keep your phone in your pocket and hear reminders about the tasks you need to do for a specific hive on that day, and be asked a set of questions, to which you reply from a set of given values, such as yes or no, or a number. That data could be dropped into a spreadsheet or other tool automatically for further analysis out of the hot sun.

Getting down to business

Regardless of the tools you use or the data you want to capture, you start by labeling each yard and hive, using a unique identifier for each. This can be as complex as you want.

If you want to use an app, you can use a Quick Response (QR) code or other barcode affixed to each hive. During hive inspections, you would take your cell phone or tablet out to the beeyard and scan the QR code, and the software will fetch the correct record. That’s pretty neat. You then complete the hive inspection tasks, make notes, add images, video, or audio, and the data is uploaded to the cloud for your later use.

If you use a QR code, we recommend you use another, human-friendly label as well. It’s easier to refer to hives by a name or number than by a barcode.



Use a naming scheme that makes sense to you and allows for expansion (through splits, packages, or captured swarms) and contraction (because of die-outs, combination, or sales). Back when we started beekeeping, we used to name our hives after TV characters. Interestingly, one of our most productive hives ever had a TV villain name and a personality to go along with it. Those bees were Hall-of-Fame level mean. But if you want to live on the edge and name a hive Voldemort, knock yourself out.

Our naming scheme is a lot less colorful now. Each yard is given a letter (A, B, or C). Each hive is given a

Date: _____	Number: _____	Date: _____	Number: _____
Box: Top Middle Bottom		Box: Top Middle Bottom	
Total bees: Few Some Many		Total bees: Few Some Many	
Bee frames: 0 1 2 3 4 5 6 7 8 9 10+		Bee frames: 0 1 2 3 4 5 6 7 8 9 10	
Drn frames: 0 1 2 3 4 5 6 7 8 9 10		Drn frames: 0 1 2 3 4 5 6 7 8 9 10	
Eggs: Y/N Brood: Y/N Cap brood: Y/N		Eggs: Y/N Brood: Y/N Cap brood: Y/N	
Pollen: Y/N Nectar: Y/N Cap nec: Y/N		Pollen: Y/N Nectar: Y/N Cap nec: Y/N	
Queen: Y/N / Didn't see		Queen: Y/N / Didn't see	
Swarm cups: 0 1 2 3 4 5 6 7 8 9 10 10+		Swarm cups: 0 1 2 3 4 5 6 7 8 9 10 10+	
Swarm cells: 0 1 2 3 4 5 6 7 8 9 10 10+		Swarm cells: 0 1 2 3 4 5 6 7 8 9 10 10+	
Super cups: 0 1 2 3 4 5 6 7 8 9 10 10+		Super cups: 0 1 2 3 4 5 6 7 8 9 10 10+	
Super cells: 0 1 2 3 4 5 6 7 8 9 10 10+		Super cells: 0 1 2 3 4 5 6 7 8 9 10 10+	
Notes		Notes	

number, which we print, laminate, and staple to the bottom super. (If your yards aren't on your property, you may want to keep the address, directions, or GPS coordinates in an accessible place should someone else need them. Follow the "hit by a bus" rule: in case you get hit by a bus, be sure to leave information about important stuff so someone else can take over.)

Next, equip yourself with whatever you'll use for data capture during hive inspections or other beeyard visits. And if you use one of the pencil-and-paper worksheets, figure out what you'll do with the information you gather so you can refer to it easily later. Again, this doesn't have to be complicated. You could just collect the sheets into a notebook or binder. If the information you're collecting is structured – mostly numbers and dates, rather than free-form notes – you can enter it into a spreadsheet program like Excel.

We use a combination of different but complementary tools. We use Excel spreadsheets to track the data we collect from our paper worksheet and to record the results of mite-monitoring tests. Some information collected from hive inspections goes into Microsoft OneNote, which is free-form, like a notebook, so we can record observations, hunches, questions, or even images or audio that might be interesting. (The Evernote app works in the same way.) We use a calendar app to schedule and remind us about hive inspection dates, mite-monitoring tests, supplemental feeding, and so on.

Of course, if you choose one of the beekeeping apps, it might be able to handle some or all your information and scheduling. Just be sure to have the app set up and ready to go *before* the information starts pouring in. And remember: you may need to change your record-keeping process as your needs change.

The fruits of your record-keeping labor

One of the immediate benefits of record keeping is that you're more prepared every time you step into the beeyard. You can review the latest notes ahead of time to see what tasks need to be accomplished and if there are any areas of concern. Right before heading out to the beeyard, we jot down reminders on scrap paper, and then tuck them under the rock sitting atop the cover of the pertinent hive. This is a low-tech but timely way to remember anything beyond routine inspection tasks.



Information is power

Just to get you started, here's a list of things to include in your record keeping. You may want to track all of these things or just some, and you'll probably have your own additions to the list.

- The data from routine hive inspections (the condition of the queen, does the hive have adequate stores for the time of year, any signs of swarming or supersedure, any evidence of disease)
- The results of mite monitoring (when you tested, with what method, and what were the results)
- Queen health and requeening activities (age of the queens, where the queens came from, results of requeening, and so on)
- Treatment activities (when you treated, which hives, and with what)

Over the course of a season, you'll refer to your notes to track queen health, mite loads, temperament, whether a hive has adequate honey stores for winter, and so on.

Best of all, in the dead of winter, as you settle in your comfy chair with your bunny slippers and cocoa, you can review your records and find the scent and sounds of summer in your records. **BC**

A few (not exhaustive) list of beekeeping apps

ApiTrack <https://hikurangienterprises.files.wordpress.com/2016/09/apitrack-summary-v1-2.pdf>

BeeCloud <http://beecloud.co/en/>

Beehive Tracker https://play.google.com/store/apps/details?id=appinventor.ai_aesrabinol.bee

Beetight <https://www.beetight.com/>

Hive Tracks <https://hivetracks.com/>

My Beekeeper <https://www.mybeekeeper.com/>

Worksheets

You can download our worksheet from the *Bee Culture* website www.BeeCulture.com

Dadant Hive Inspection Sheet Notepad. <https://www.dadant.com/catalog/m01940-hive-inspection-sheet-notepad>.

Puget Sound Beekeepers Association worksheet. http://www.pugetsoundbees.org/wp-content/uploads/2014/04/Hive-Inspection-Sheet_PSBA.pdf.

Talking with Bees. www.talkingwithbees.com/wp-content/uploads/2013/02/BBKA-record-keeping.pdf.

University of Florida, IFAS Extension. http://osceola.ifas.ufl.edu/pdfs/CSA/KVBA_Hive_Inspection_Sheet.pdf.

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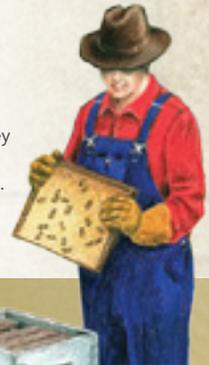
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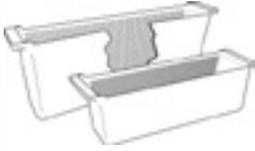
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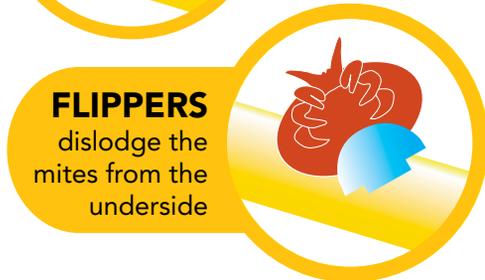
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ADVERTISING

Jessica Dally

Facebook marketing and the dreaded Facebook algorithm. What it is, why it matters, why people care. It has changed over the years. No longer do fans see everything pages or friends post. People complain, both customers and business pages but they shouldn't and here's why . . .

In the last article, we talked about many different social media platforms available to small business for marketing. This time we'll discuss the big player, Facebook.

In my last position I had the great benefit of having full discretion over a six-figure marketing budget. I could choose to spend a whole lot of money anywhere I wanted to. And indeed I got to experiment and see what worked over a wide array of platforms and marketing options.

Across the board, I found that bang for the buck, Facebook outperformed every other option every single time. Sure, you can get a LOT of business using Google Adwords, but you're going to spend a lot of money doing

it. What is a lot of money? On the low end, we're talking \$1000 a month. Many big players spend \$15000.00 a month or more. That's the correct number of zeros folks.

Billboards, print advertising, television, radio. Each and every one of these options costs and costs BIG. But Facebook, when done well can cost you almost nothing. In my business, I sold \$30k worth of product with one \$10 ad. You're going to be hard pressed to find another advertising platform that will have that rate of return.

Of course, there is no easy button on Facebook advertising. You can't simply make an ad, press run and watch the money roll in. Every aspect of your ad has to be correct for it to work, but when done well Facebook ads work far better than any other platform out there at this time.

But why advertise, isn't Facebook free?

Yes, and no. Let's take a simplified look at Facebook evolution.

When Facebook first came out it was just aimed at people. It was you and your friends, connecting on a website to share pictures of your kids, your dinner, your favorite recipes, a story from the news, whatever. But like anywhere people congregate, businesses realized this was a prime advertising opportunity, and soon a typical profile was no longer a person but a business. Facebook realized this was an issue and created pages so companies could create an identity that wasn't a "person." Enter "pages," now used for community events, clubs, celebrities, businesses, government, etc.

In the early stages everything got equal play. When your friend posted something, you saw it. When a page you liked posted something you saw it. Period. There was no way to hide anything. And that was a bit of a bummer. Because let's face it, we all have those family members we have to connect to, but we really don't want to see ALL THE TIME. No Uncle Ed, I don't want to see that post about what you did every other minute.

So Facebook started allowing you to change how much you saw from pages and people. And you still can, both from people and pages. But eventually, it also realized that it could do some of this work for you.



SIDENOTE: There are a LOT of issues surrounding the control Facebook has taken over your Facebook feed. Suffice it to say that, should you want, you CAN make it so everything you have liked shows up in your feed. You won't like it, I promise, but you can do it. You absolutely can craft your feed so it shows whatever you want. But that's another article for another time.

All of this is what is called the Facebook Algorithm and it is set up for one reason and one reason only. NO, it's not simply to sell businesses ads though many frustrated business owners will tell you that's the case. It's there for one reason. Remember, Facebook is about connecting people to other people. It wasn't built so you could sell your product. If Facebook makes it easy for every spammy business to push bad ads to everyone eventually all the actual people will go away and there will be no business to be done anymore.

It is in Facebook's best interest, and I'll argue ours too, to make sure that what gets out to people is content people like. So that's what the algorithm does. It pushes content to people that they want to see, and it doesn't push anything people don't want to see. It measures that by likes, clicks, comments and a bunch of other complicated rules. Basically, if you are sharing content no one cares about it's not going to share it with your fans. If you are sharing stuff all of your fans love, it will show it to a lot of people.

So why ads?

Do ads help you get past the algorithm? Yes and no. Facebook shows ads to people in almost the same way it shows unpaid content. If your ad is great and targeted well it will show it for less money. If you target poorly and make a bad ad, it will cost you more to show it to the same number of people.

At first, this may sound mean, but when you think about it, it's actually pretty great. Bear with me for a second. We've all had ads shared with us (be in on social media, via email, or on regular websites) for products we don't care about or like in any way. Those ads are annoying. They detract from our experience of that website and can be distracting.

And yet, every once in a while, you get an ad for something that you actually want. You may not buy it right away, and yet sometimes it is actually appreciated. A much lower price for something you were looking for, something you didn't know was out there, a group you would like to join. Facebook realizes that one type of ad detracts from Facebook while the other does not. And

There are many metrics to watch when you run your ad

- **CPC- Cost Per Click - Keep this low!**
- **CTR- Click Through Rate- Aim for a high number here!**
- **Relevance Score- 10 is as high as it goes. The higher the number here the less it costs to get your ad out to people. This shows that you've targeted people who really want to see your ad!**

Performance				
Avg. CPC	Results	CTR %	Social %	Relevance Score
\$0.05	349 Post Engagements	29.850%	12.29%	10

it's going to make an advertiser who does bad work pay. Personally, I appreciate that!

So how do you do good work?

There are three aspects to any and all Facebook ad creation.

Image – remember the last articles where we talked about tools? This is where you pull out Canva and Pixlr and create a great image for your ad. Use VERY little wording as Facebook does not like text in your image. Make your image stunning. Using those tools it's not nearly as hard as you think. But remember to tie your image to your ad.

Wording – What are you selling? What is your unique value proposition? What does unique value proposition mean? It's OK not to know . . . it's that thing that makes you and your product special. Is your honey local? Are you going to be at the farmer's market this Saturday? Do you sell your beekeeping supplies locally (no shipping!), can you pollinate local fields in small quantities? Whatever it is you know what it is. Make sure your customers know what it is!

Targeting – This is the big one folks and where people really mess things up. Your natural tendency will be to cast a wide net. But here's the thing about big nets. They cost big money. Your job is to do the opposite. Cast a small net. Who is your ultimate fan? Who is that person who is most passionate about your product? If you're a local shop, don't advertise to everyone in your state. Advertise

What's your marketing objective?		
Awareness	Consideration	Conversion
Boost your posts	Send people to a destination on or off Facebook	Increase conversions on your website
Promote your Page	Get installs of your app	Increase engagement in your app
Reach people near your business	Raise attendance at your event	Get people to claim your offer
Increase brand awareness	Get video views	Promote a product catalog
	Collect leads for your business	Get people to visit your stores

close in. Don't advertise to anyone who MIGHT keep bees, advertise to those who absolutely do.

The tighter your target market, the less it costs you. More important, when you advertise to those people who are likely to be huge fans, they will advertise for you into the markets you'd hit with a bigger net without costing you big net money. Think about it this way, you get to the people who are knowledgeable, and when their friends want to know where to get local honey, buy beekeeping supplies, learn about a local club, etc., they will advocate for you.

Finally, when it comes to targeting, most of the time you should not be targeting your current fan base on Facebook. You can exclude your current fans. Use your email list or create a separate ad to target these fans. Don't preach to the choir with your ads. Seek out new business.

Run your ad

Now that your ad is running how long do you run your ad? When you're only spending \$10 you simply can't run an ad for months at a time, and you don't want to. For most businesses, running ads for a week, maybe two is often the optimum amount of time. Remember, you're looking for power users, those who will be very excited about your product. You do not need to oversaturate them with ads. No one likes being inundated with advertising.

So hit them with an ad and then stop before they're bored. Then either create a different ad with completely different content (and target to different people) or wait a bit before you advertise to this group again. You do not want to be the person who annoys people with your ads.

Well folks, that's the basics of a VERY complicated but exciting platform for small business. Those who use Facebook well can see an incredible amount of business growth without spending much money. It can be tricky to get to know what works for you. Experiment, look at the statistics Facebook gives you about your ad and change things up to make your ads better.

The key point is DO NOT spend a bunch of money on any single ad, especially while you're learning. If it doesn't seem to be working go back up to the three key aspects of your Facebook ad . . . there's something that isn't right there.

Good Luck! **BC**

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THE NATIONAL HONEY BEE SURVEY IN VERMONT

Made Possible by Samantha Alger and Alex Burnham

Ross Conrad

The massive increase in U.S. honey bee colony losses in the last decade has prompted a comprehensive examination of colony health in apiaries throughout the United States. Known as the National Honey Bee Survey (NHBS), the effort is a collaboration between the USDA Animal Plant and Health Inspection Service (APHIS), the Bee Informed Partnership (BIP) out of the University of Maryland (UMD), the USDA Agricultural Research Service (ARS) and the cooperation of 40 states, two territories (Puerto Rico and Guam), and the island nation of Grenada.

The NHBS began in 2009 in the states of California, Florida and Hawaii. In 2010, the survey expanded to include a total of 13 states as funding for the survey increased. The survey then grew to 34 states in 2011, shrunk to 32 states in both 2012 and 2013, 28 states in 2014, and grew again to 37 states in 2015, before hitting an historic high of 40 states in 2016. This effort establishes a baseline health measure for honey bees in the United States through the creation of a large and comprehensive honey bee disease, pest, (and as of 2016) pesticide residue database.

The survey has verified the absence of potentially invasive and harmful honey bee pests and pathogens within the United States such as the parasitic mite *Tropilaelaps* spp., the Asian honey bee *Apis cerana*, and slow bee paralysis virus (SBPV). Confirming the continued absence of these exotic pests and pathogens is the primary objective of the NHBS.

Since the NHBS provides a relatively quick method to detect such pests and diseases should they enter the U.S. it may be used to facilitate efforts to prevent their expansion in America should they be discovered.

The survey has also provided the opportunity to document the incidence of known honey bee diseases in the U.S. These baseline data, including historic data from research institutions such as the ARS and other ongoing field sampling and management surveys, have been incorporated into a single database as part of the Bee Informed Partnership (<https://beeinformed.org/>).

Each state submits 24 samples which are collected from apiaries (stationary, migratory and queen breeding) across each state and territory, with 48 collected in California (24 from stationary apiaries and 24 from migratory apiaries). A minimum of eight hives are sampled in each apiary, and each apiary sampled must contain at least 10 hives.

The survey includes a visual inspection of the colonies prior to sampling. The presence of pests or diseases are recorded and entered into both the BIP database and

the U.S. National Agricultural Pest Information System (NAPIS) database although they are not included in the final analysis. This is because visual identification of the following diseases and pests are dependent on the training and experience of the sampling personnel, and therefore they are not included in the Reports:

1. American Foul Brood
2. Black Shiny Bees
3. Chalkbrood
4. Deformed Wing Virus
5. European Foul Brood
6. Idiopathic Brood Disease Syndrome (IBDS)
7. Sac Brood
8. Small Hive Beetle Adults
9. Small Hive Beetle Larvae
10. Wax Moth Adults
11. Wax Moth Larvae

Folks at the UMD send out the sampling kits and each state is responsible for collecting the samples and mailing them in for testing. A critical component of the NHBS at the state level are the people who carry out the sampling. It is primarily this lack of sampling help that is the reason the states of Arkansas, Kansas, Maine, Missouri, Mississippi, New Hampshire, Ohio, Rhode Island, Oklahoma, and Wyoming do not participate in the survey. The state of Vermont would be on this list of non-participating states if not for the efforts of PhD candidate, Samantha Alger, and PhD student, Alex Burnham, both of whom attend the University of Vermont.



Samantha Alger and Alex Burnham prepare their sampling equipment. Photo credit: Michael Willard



Sam and Alex sampling bees for diseases and parasites. Photo Credit: Michael Willard



Alex and Samantha check on their bumble bee colonies. Photo Credit: Samantha Alger

Samantha spearheaded Vermont's involvement with the survey in 2015. For the past two years she and Alex have worked together to both coordinate the survey and collect samples for Vermont. They plan to continue with the NHBS in 2017.

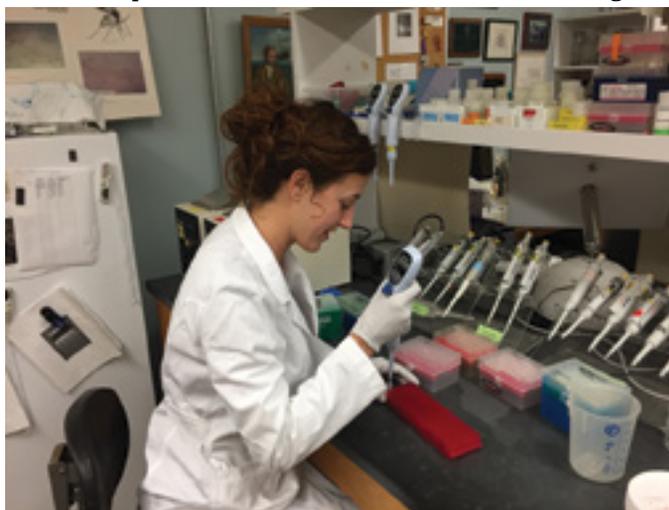
Assisting Vermont beekeepers in participating in the NHBS came naturally to both Samantha and Alex. Alex began beekeeping as a child, working in his grandfather's apiary in southern Vermont. Samantha began beekeeping and learned to rear hygienic queens during a winter she spent in Hawaii. Now, as graduate students, they are both deeply involved in research aimed at understanding the threat of disease to both our managed and native bees. Samantha's PhD dissertation focuses on the prevalence, effects and transmission of RNA viruses in bumble bees. In order to understand if Vermont's bumble bees are contracting the same viruses affecting honey bees, Samantha and Alex conducted a field survey of RNA viruses in Vermont bumble bees and for the first time in Vermont, confirmed the presence of at least two viruses in Vermont's bumble bees. While more work needs to be done to understand how bumble bees are affected by these viruses, this work is timely and relevant. In the same year of the survey, three bumble bee species were listed as either state endangered

or state threatened. Understanding how these 'so-called' honey bee viruses are transmitted and affecting bumble bees is critical to the conservation of these important crop pollinators.

It was this survey that found that the Rusty Patch Bumble Bee that had been very common in Vermont in 2000, had apparently disappeared from the state by 2015. This study of Vermont pollinator populations was part of the research and data that the U.S. EPA referred to when they made the decision to add the Rusty Patch Bumble Bee to the Endangered Species list.

In 2016, Alex and Samantha conducted an experiment to test if viruses can be transmitted between bee species through shared floral resources. They grew plants in green houses and allowed honey bees infected with virus to forage on the flowers in the enclosure. They later allowed virus-free bumble bees to forage on the same blossoms to see if the bumble bees would become infected with the honey bee pathogens. So far, the pair confirmed that honey bee viruses are left behind on flowers as bees forage. More lab work needs to be done to test if bumble bees can later become infected after visiting these flowers.

During Spring break in 2016, Samantha had the chance to travel to Cuba and interview beekeepers on the island. Cuban beekeepers have to deal with many of the same challenges that American beekeepers face such as *Varroa* mites, Small Hive Beetles, and American foulbrood. However, due to the U.S. embargo on Cuba, the island's beekeepers use management controls to keep disease and pests in check rather than drugs and miticides. Samantha reports that while many pests and pathogens are present in Cuba, beekeepers in Cuba are not experiencing the same losses elsewhere in the world and could be one of the last countries where honey bee populations remain healthy and untouched by dramatic increases in the kinds of honey bee losses that has swept the world since the advent of Colony Collapse Disorder. Samantha suspects multiple reasons for Cuba's healthy bees. It could be differences in Cuban management techniques or that bees, pathogens and pests on the island have reached an evolutionary equilibrium given the island's isolation. She also believes the lack of pesticide use could play a role. Now that the embar-



Samantha checks samples in the lab. Photo Credit: Alex Burnham

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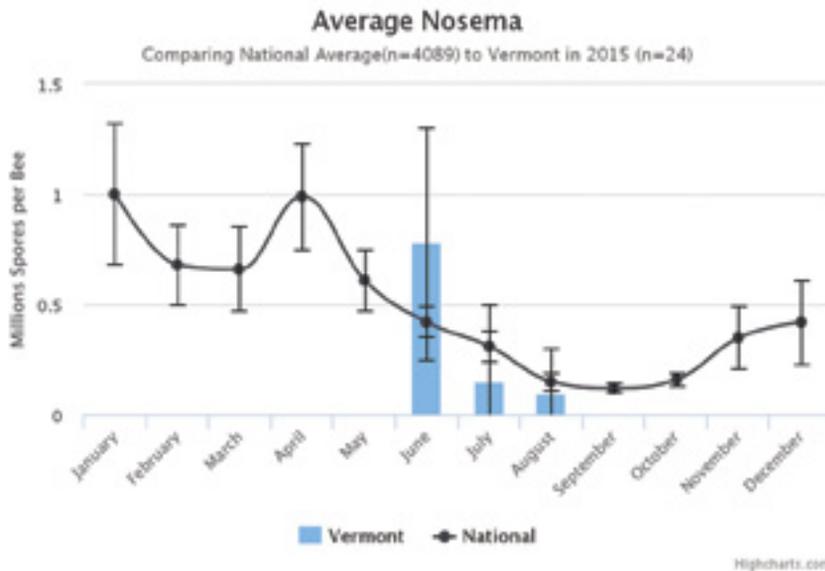
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This "Average Nosema" chart shows the national monthly average nosema level based on all samples and all years in the APHIS survey, charted as a line. The error bars are based on the 95% confidence interval which represents the range that 95% of all samples are within. The columns represent the average nosema level in samples collected in the state Vermont during the year 2015. The error bars for the state monthly average represent the minimum and maximum nosema level found. Months without columns have no samples taken during those months. Credit: Samantha Alger and Alex Burnham

go has been lifted, it is possible that pesticide use will increase and has the potential of affecting their honey bees. Disentangling the threats to honey bees remains a research concern. Samantha is currently collaborating with a group of UVM and Cuban researchers to learn how Cubans are maintaining healthy honey bees despite the presence of bee pests such as Varroa. She believes there will be lots to learn from Cuban beekeepers both from a management and scientific perspective.

Samantha received a National Science Foundation Graduate Research Fellowship in her second year at UVM. It provides her with a stipend for three years and an education allowance for tuition and fees. Prior to receiving the fellowship, she supported herself through a graduate teaching assistantship. While Samantha found teaching at the university level rewarding, the fellowship allows her to have the time to focus on outreach projects such as the NHBS.

Samantha is currently working with Alex, UVM post doc, Leif Richardson, and a Vermont beekeeper on a

crowdfunded research project examining the role of migratory bee operations in disease spread. Specifically, the project will test the theory that migratory hives that pollinate almonds in California acquire more pathogens than their stationary counterparts. The study will also test if migratory hives will transmit disease to stationary hives upon their return to winter yarding areas. They hope this project could help provide evidence needed to increase funding to apiary inspection programs across the country, as these programs are integral for detecting diseases that may enter states through migratory operations. The beekeepers in Vermont are grateful to Samantha and Alex for their interest and commitment to bees and beekeeping. **BC**

Ross Conrad is the author of *Natural Beekeeping and will be leading organic beekeeping classes for beginners, May 13-14 in Lincoln, VT; June 1-3 in Craftsbury Common, VT; and June 24-25 in Bristol, VT. Contact Ross at 802) 349-4279 or dancingbhoney@gmail.com for more information.*

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Don Coats

His Veterinarian Love For Animals Also Embraces The Pollinator World

Dewey Caron

Don Coats, DVM (retired) began beekeeping during his last years as a dog and cat doctor. What started as a hobby and passion, has now evolved to doing research on clinical aspects of the honey bee. His enchantment for bees foraging in meadows now includes charting a path to keep honey bees healthy and flourishing with all pollinators on native blooms as a public advocate for native bees and native plants. -

Don, an Illinois native, a graduate from the University of Illinois with a degree in veterinary medicine (1966), following a Bachelor's degree in from Southern Illinois University. After a year in small animal practice in Springfield Illinois, the lure of research brought him to Wilmington, DE as research scientist in animal medicine at Atlas Chemical Industries, now known as Astra Zenaca. Disenchanted after one year with that role, he returned to small animal veterinary practice with Dr. William Butler, at Centreville Veterinary Hospital in Wilmington, DE.

After nearly a half century committed to healing pets and being a comfort to pet owners, retirement called for a change of focus to fill a motivational void. Beekeeping fulfilled Don's devotion to science and natural history. He has found a niche conducting part-time disease research on his own 20 hives and engaging 12 local beekeeper clients in northern DE/southern PA in studies on preferred management services.

A hobbyist beekeeper for over 15 years, he followed his early training seeking to approach beekeeping management issues from a clinician's perspective, now as a citizen scientist. It has been a natural progression from a caring vet to citizen scientist as he now seeks to engage - beekeepers and other bee scientists in bee health improvement.

One of his concerns is understanding and analyzing the reasoning behind beekeeper management practices, including prophylactic use of antibiotics. As a vet he did not prescribe antibiotics for small animals without first seeking to make a proper diagnosis. He's been disappointed in witnessing beekeepers electing to use antibiotics based on nonspecific signs and insufficient diagnostic evidence. Likewise, he perceives some practices in Winter hive care to be based on tradition, rather than principles of biology or tested evidence.

Don relates that the person he learned his beekeeping from had been using terramycin to medicate his bees without a history of having had disease. When Don questioned prophylactic use, his mentor said that as far

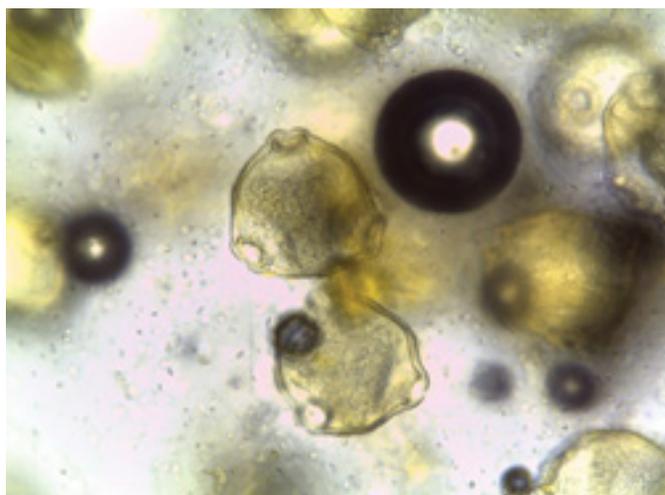


as he knew 'everyone' did it and it was better to be 'safe than sorry.' Such traditions die hard. Recent changes in availability of antibiotics is an improvement, Don feels, toward more rational disease prevention and detection.

One means of addressing his concerns and what he considers a highlight in his second career is offering training in pathogen identification and assessment by conducting microscope workshops for beekeepers at local, state and additionally at the regional EAS conference. Sharing the delights of discovery in real time with other beekeepers, old and new, is akin to advising a client on new puppy health care according to Don.

Don offered a full day of microscope use at the 2016 EAS conference in Stockton University in NJ. Included in the course were mites, nosema and pollen ID along with bee organ tissue mounting and other histopathic preparations, assessing nectary potential of blooms and finally fecal smears from bees. Don will again be offering a microscopic short course at the 2017 EAS Short Course at the University of Delaware. The 60th EAS Conference will be July 31-Aug 1 at the University of Delaware, Clayton Conference Center, Newark, DE

The 2017 workshop will be designed to cover three categories; (1) pollen identification and collection protocol, (2) honey bee anatomy/dissection of the abdomen, and (3) Nosema assessments. Questions and discussions among the students generate a learning experience for students and instructor alike, Don finds. In addition to this effort at EAS, Don also conducts small workshops in



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his home laboratory, as well as an advanced forum type event in conjunction with larger meeting events such as state beekeepers conferences.

Don feels that the microscopic analysis of type of pollen in honey to be on some beekeeper's 'bucket list' of deepening interest and understanding of their honey bees. Such interest ranges from "what sources have my bees been visiting" to an aesthetic appeal, or even a deeper understanding, of "plant behavior". Confirming the source of a honey to the consumer often can lead to a fascinating dialogue. Actually observing those jeweled beads under the microscope generates a wonderful "Ah Ha" response.

There is a more practical aspect as well as recent seizures of honey can attest (on August 12 around 42 tons of illegally imported Chinese honey was confiscated in Miami, the third such significant seizure of honey in four months). The most recent seizure, honey transshipped from Taiwan to the U.S., was confirmed as originating not in Taiwan but rather in China because of the characteristic pollens and antibiotic "footprint" used in its production. See <http://www.bee-culture.com/catch-buzz-bee-not-bee-cbp-partners-seized-132-drums-honey>

Beekeepers using microscope can track pollen sources through seasonal changes. Trying to relate protein nutritional value to bloom type is a challenging and practical subject that Dr. Debbie Delaney and graduate students at U of Delaware have been working on for several years. This work, Don's contribution, and those of Dr Peter Lindtner, whose book *Garden Plants for Honey Bees* is a popular resource for identification of pollen grains and flowers, will also be featured at EAS 2017.

Don is able to extract samples of pollen from honey using a Millipore filter devise, originally used to diagnose heart worm disease in dogs. Don and others consider it possible to catalogue protein content in pollen. Pollen is the bee food that builds strong bee babies.

Note: during the 2017 EAS meeting Peter Lindtner will offer field trips to flowers, at both Mt Cuba, a 500 acre natural preserve in Northern Delaware (www.mtcubacenter.org), and at the Nemours Gardens, a 300 acre DuPont estate in Wilmington, cited as the largest classical French Garden in North America <http://www.nemoursmansion.org/>. The Nemours Mansion is a highly regarded tourist visit in the Delaware Valley.

Don's studies on Nosema are motivated by his clinical assessment that suggests that the organism is not as damaging to bee colonies as has been historically perceived. Don wonders if beekeepers are misinterpreting priorities of concern. Peaks in spore counts appear to run their course seasonally. High concentrations of Nosema appear in strong, robust hives as well as in weak colonies. Don thinks it is appropriate that the haphazard, often calendar-based medication treatment with fumagillin for this organism is falling out of favor in the US, as it has in other countries.

In order to study Nosema in more detail, Don has conducted a controlled inoculation of Nosema to nucs confined in netted chambers. Bee forage plants installed in the netted tent provided a feeding station but had to be removed before the end of the trial. Efforts to inoculate nuc colonies with 300 million spores were not successful. Methods to insure reliable test colonies will be continued.

Paraffin beeswax disc for bee dissection.



Learning from other beekeepers and conservationists...

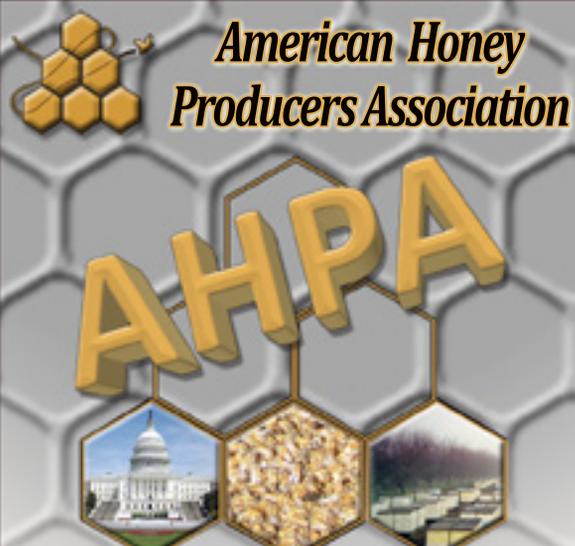
Leveraging bee club efforts with efforts of other local and regional conservation organizations toward forage enhancement by creating wildflower meadows and replacing monoculture grass lawns can have many benefits. Don has started a small nature study group called Delaware BeeWatchers. Using the protocol developed by Master Gardeners and Xerces Society, they have been counting native and honey bees in different kinds of habitat.

The citizen science goal is to demonstrate the practical and aesthetic values of meadows and promote an appreciation for the fascinating world of native bees. Populations of native bees, (overlooked as subject material for backyard nature study), multiply rapidly when native plants are available. This forage, of course, is shared with honey bees and could be expanded massively in suburbia and the neglected perimeters of agricultural fields.

DE BeeWatchers are making a special effort to share information and devotion to native bees and meadows with the public. Recently this group set up an informational booth at Winterthur Gardens, another DuPont family estate with a fabulous garden and Americana collection. EAS 2017 registrants will have the opportunity to visit this estate during the July 31-Aug 4 Annual EAS Short Course and Conference. It is a mere 10 miles from Newark.

Don is encouraged that the hobbyist honey bee community is making the effort to learn about nature bees and other pollinators beyond honey bees. He feels working with and setting goals that can be shared with other organizations can be as rewarding as honey harvest or candle making. And working in conjunction with others helps advance the mutually shared goals more rapidly and reach out to groups that might not be approached.

Don, like many beekeepers is retired, but he is continuing to work at understanding and keeping bees more intensely than when he was a full-time practicing Vet. He hopes to give back to beekeepers some of his love of bees and knowledge of pollen and bee pathogens, via his microscope workshops and engagement of the local bee community, in citizen-science based projects and better understanding of what healthy means in the bee colony and beekeeping community. **BC**



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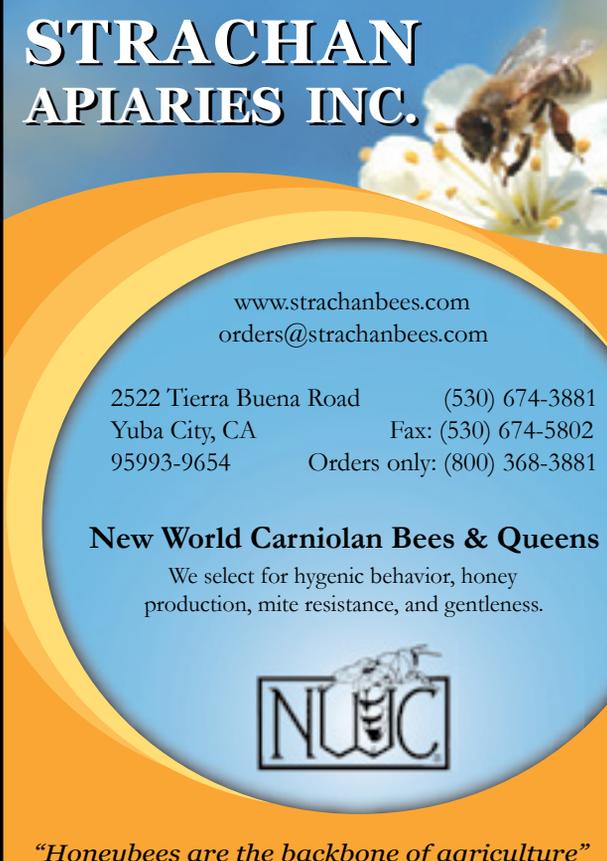
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It's Hive Inspection Day With Your Mentee!

Ann Harman

Every student of the beginning beekeeper classes of the East Cupcake Beekeepers Association is assigned a mentor. In order to help the mentors, and also to encourage club members to be mentors, the club put together a little handbook to guide the mentors. It is a short guide but it does help mentors to keep on track, especially with overenthusiastic beginners who seem to have endless questions that can be quite jumbled up. Mentors do need to think back in time when they were beginners without a mentor. Hive inspections sometimes seemed baffling. Let's take a look at the short guide.

The first question to ask your mentee is: *Have you opened your two hives and inspected them?* The answer is actually going to depend on whether the mentee is just beginning beekeeping with packages or nucs, or has had their colonies for several months, or perhaps a second-year beekeeper, a former mentee, who has called you for help with a possible problem.

Although the beginning mentee was strongly encouraged to have the mentor present for hive inspections, some eager students just can't resist having a look inside. If a club buys package bees the first opening would be to see if the queen has been released from her queen cage. As a mentor you hope that the colony has not been disturbed during the first few days of their life with a new queen and trying to construct comb. If a club were able to supply nucs to the students then the first inspection would be to see if all is well and the nuc colony is expanding into its new home. The second-year beekeeper just felt something did not seem normal compared with the last inspection. Instead of relying on this beekeeper's description, a visit will be more productive.

Before even putting on veils and lighting a smoker the mentor

That is a question frequently asked of mentors by beginning beekeepers. Many mentors attend meetings given by state beekeeper associations and by the larger regional ones, such as Eastern Apicultural Society (EAS), Heartland Apicultural Society (HAS) and Western Apicultural Society (WAS). These regional meetings also feature mentors giving workshops on mentoring. Also mentors will be giving other presentations.

These larger meetings offer an assortment of learning experiences. Some of the speakers will be scientists bringing in new information on their research. Other speakers will come from those in Extension, pollination, as well as professors and individuals in related fields such as agriculture.

Workshops on a wide range of topics are held. Open hive instruction is always well attended. There is always time in the program for beekeepers to relax, share swarm stories and enjoy a meal together.

This year the Eastern Apicultural Society (EAS) will meet at the University of Delaware in Newark, DE, just a few minutes off I-95. Dr. Deb Delaney is the apiculture professor there today, following the retirement of Dr. Dewey Caron. The Short Course, with class lectures from beginner to advanced beekeeping begins on July 31, 2017. The Short Course is followed by the conference itself from August 2 through 4. The famous EAS Master Beekeeper exams, four total, will be given during the week.

The conference will feature award-winning scientists like Tom Seeley and Clarence Collison, apiary inspectors, practiced beekeepers like Michael Palmer and Jennifer Berry along with experts on queens, making mead, honey bee pests and more. Families and children are welcome and the youngsters can participate in activities, including a Kidz Bee Academy just for them. The apiary is ready for open hive instruction. Bring your best honey for the Honey Show and a jar or two for the Honey Exchange.

Keep in touch with the Eastern Apicultural Society www.easternapiculture.org, and also on Facebook in the following months to make your plans for attending. Your beekeeping skills and your mentoring skills will be enhanced.

has a good opportunity to listen to the mentee's description of the hive inspection and when it took place. The 'why' of doing that inspection is also important because, as a mentor, you have always told your mentee to ask 'why am I opening this hive?' You, as a mentor, have always emphasized the importance of having a plan so that the disturbance to the colony is brief and not disruptive but is informative. A mentor needs to listen carefully to the descriptions given. In this way a mentor can discover both successes (mentee saw eggs and young larvae) and problems (the smoker went out). The successes and problems can then be discussed without standing endlessly over an open hive.

Now it is time to put on veils, light the (now) well-packed and lit smoker and go to the first hive. Set the smoker aside for a time and ask the mentee: *What do you observe at the entrance?* Be sure nobody is standing in front of the entrance. The bees need to fly in and out freely. Caution the mentee to consider climate (bloom time of forage plants), weather (temperature, sun, wind), time of day (mid-morning, late afternoon) since conditions outside the hive influence bee activities. Not every hive has a place for a bee to land and then walk into the entrance. It is easy to make and attach a landing board in order to make observations at the entrance. Those observations can be very useful and also entertaining.

Ask the mentee to comment on the overall activity seen. During times of peak forage bloom bee traffic can resemble city rush hour on a workday. If pollen is seen on returning bees has the mentee seen different colors? If so then this observation could lead into a conversation about possible forage plants. Guides to pollen colors and their plants can be found on the internet. However, perhaps the best way to try to make identifications

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is to collect some pollen in a pollen trap where individual pellets can be observed easily.

Since not every returning bee will have full pollen baskets, ask the mentee to guess what these returning bees could be doing. Depending on weather these 'empty' bees could be carrying water as well as nectar. See if a bee is returning with pollen baskets full of something shiny. Pollen does not look shiny but propolis does.

Sometimes the guard bees can be seen just waiting inside the entrance and not taking part in the flight activities. Watching guard bees confront and chase off an intruding insect is fun to watch. Undertaker bees might be seen dragging a dead bee out. Some entrance activities, such as returning drones or orientation flights, depend on the time of day. So it is worthwhile, not only for beginning beekeepers but also for all beekeepers, to do some entrance watching at different times of day. In addition have the mentee note any different directions flying bees take when leaving the entrance. Different scout bees have found different sources.

Now that entrance observations are finished it is time for the mentor to ask: *Let me see you use smoke and open up the hive.* Beginning beekeepers either tend to use astonishing quantities of smoke or seem to be afraid to use any at all. A technique useful for working with African bees is actually suitable for all honey bees. All it requires is a bit of patience. Show the mentee how to apply several good puffs into the entrance and just under the telescoping cover. Then wait a minute – a real minute or up to two. That time allows the colony bees to fill up on honey and become less interested in disturbance. True, some stocks of bees seem to be quiet and gentle needing little smoke, but even these can get up on the wrong side of the hive and have a grumpy day.

In some areas of the country hives can be disturbed by animals, such as skunks. Since the skunk visits at night beekeepers might not be aware that a skunk has become a nightly pest. A normally quiet, calm colony becomes overly defensive and does not respond to the usual amounts of smoke. Both mentor and mentee need to search for reasons

the calm colony turned defensive and remained so for several days.

Beginning beekeepers sometimes seem to apply smoke for no particular reason. Keep encouraging the mentee to observe the bees' behavior. If they seem to be working quietly perhaps no smoke is needed at the moment. However, if they are flying up out of the hive or running around aimlessly then some smoke may be needed. Sometimes bees will line up between the frames and seem to be watching the beekeeper. A bit of smoke would be useful at this time. Sometimes a frame or a hive tool gets dropped onto the open hive. Reassure the mentee that such accidents happen to all beekeepers. Help the mentee recognize various behaviors and watch the results of puffs of smoke.

Another question needs to be asked when the hive is opened: *What does the sound of the colony tell you?* Beekeepers can learn the many sounds a colony can make. Help the mentee recognize the quiet hum of an undisturbed colony hard at work. Alert the mentee to the change of sounds when the colony is accidentally bumped or after trying to remove a stuck frame. Encourage the mentee to use the change of sounds to determine whether the colony is becoming calm again or remains disturbed and should be left alone to be inspected on another day. One very characteristic sound is that of a queenless colony. It just seems to sound unhappy, worried, and definitely not normal. As a mentor you might have to wait quite a while to have a queenless colony, either yours or the mentee's or in someone's beeyard. It is a very useful sound to recognize.

Now for a return to the reason for the mentor's visit to the mentee's beeyard. *Why are you opening this hive?* The answer depends on many factors and may well lead to a repeat of some or all questions given above. The previous inspection may have been reassuring that all was well. The colony may be working hard with its many projects (caring for queen, preparing food stores). Or it could have shown a possible problem that needs further investigation. So the reason for an inspection, whether for overall colony health or amount of stored food, will depend on many factors.

The *why* also depends on where the mentee lives. Today beekeepers are found in cities, in backyards or on rooftops. Supplies of pollen and nectar could be variable throughout the beekeeping season. Does the city have parks planted with bee-useful flowers? Are the numbers of city beekeepers increasing, possibly too many for the available forage? Suburban beekeepers are living in a world of lush green lawns without a clover or dandelion to be seen. Backyard vegetable gardens may be in the care of someone whose favorite tools are spray cans of pesticides. Neighbors may have swimming pools. Not all the neighbors like bees. Rural beekeepers must know the farmers and crops within the bee forage area to know what pest controls are being used and when.

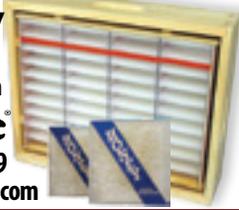
The mentor can encourage the mentee to consider the climate – hot, dry desert of New Mexico, the long cold Winter of Minnesota, the wet, cool coastal climate of the northwest or the temperate climate of the Mid-Atlantic states. In this way the mentee can understand available forage and time of bloom. Not only climate but also weather will influence the *why* of hive inspection. Drought reduces plant growth and flowering leading to a dearth of nectar and pollen. The mentor will encourage the mentee to see, inside the hive, the effects of climate and weather.

The *why* also depends on the calendar. The *Varroa* mite and its viruses have caused beekeepers to monitor the population of mites with sugar or alcohol shakes to determine treatments. A mentee may need help with the first shake – scooping up bees into a container and looking for the dislodged *Varroa*. A hive inspection will be needed when swarm season is approaching. The mentee also needs to know when preparations for Winter need to be finished.

A series of successful mentor visits are valuable for both the mentor and mentee. No matter how many years a mentor has been keeping bees, they can always teach you something. **BC**

Ann Harman teaches new beekeepers from her home in Flint Hill, Virginia and all over the world.

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Lee Correctional

Gee Atkinson

The Bee Program Here Is Only One Of Many We Have

If you are like me, I rarely drive by Lee Correctional Institution on Wisacky Highway without glancing over and wondering what it must be like inside.

It can't be good. Life for inmates inside a maximum security prison is fraught with challenges and dangers and hard to imagine for those on the outside.

The state's largest maximum security prison, located here in Lee County, gets plenty of bad press and that is why I was a little nervous when Bill Hemby, a local beekeeper, contacted me and suggested I do a story on the beekeeping program going on inside the walls of Lee Correctional.

When you arrive at the prison, you hand over your car keys and license at check-in. You also take off any belts, jewelry and your shoes. You're patted down and they check the soles of your feet.

That did little to put me more at ease but the correctional officer was friendly and two ladies in front of me were bringing in dozens of cupcakes to share with inmates. I began to feel a little better about my visit.

Then I met Clark Newsom, Internal Communications Director for the SC Department of Corrections, and Jimmy Sligh, programs manager at LCI. They escorted me deeper into the prison, through several locked and guarded gates, until we emerged into a yard where there were inmates – walking dogs! In the yard, underneath a small shade tree, was a cat and several kittens stretched out enjoying the sunshine. It sure didn't look like I was in the yard of a maximum security prison.

Inmates with dogs on leashes were going about their daily routine with well-behaved dogs in tow. One inmate

sat on a bench brushing his dog, who had just received a bath.

Sligh told me the Healing Species Prison Program pairs rescued dogs and prison inmates together for second chances in life. The dogs, which frequently have been abused and are considered "unadoptable," live with their inmate handlers, receiving unlimited attention and affection. More than 35 dogs have been socialized by LCI inmates and found homes.



The canines are not, of course, the only ones benefiting from the program. An inmate named Ramsey said caring for his dog has taught him responsibility for something other than himself. "It helps me spend my time in here in a positive way," he said.

I learn it is just one of many beneficial programs offered through the Better Living Incentive Community, a program created in 2012 by Michael McCall, deputy director of the South Carolina Department of Correction, with the vision of "changing the prison culture from one that fosters and encourages self-destructive behavior patterns to one that addresses and corrects the criminality and self-destructive mentality through peer-to-peer accountability."

BLIC residents (they don't call themselves "inmates") are selected based on good behavior and housed in a separate dorm.

Each BLIC resident agrees to abide by the rules set forth in the program's "contract." Much of it hinges on respect, for oneself and others.

"You can tell a difference in the people who are in the BLIC program and the ones who are not," says Hemby, who has been volunteering his time for the past several months.

The bee program is one of many BLIC activities. Mack Flake, a volunteer who is now deceased, really got the bee program off the ground at Lee Correctional, says inmate and BLIC resident Chris, who heads up the program. "Everyone who wants to be part of this program has to go through a beginner's class then pass a test to start coming out here in the beeyard," he says. "I got involved with bees in 2010 and just fell in love with it. The idea of going out there and looking in the box and there was a handful of bees then within a month you got a whole box full of bees – I had to know how that happened. You learn a lot of life lessons working with bees."

Sixteen of the BLIC residents in the program recently passed the test to become certified beekeepers.

This Summer they "pulled their first honey," 228 pounds of it, and the day I visited they were getting the hives ready for Winter.

Hemby said what the inmates have done is impressive. "Up until I got here, everything these guys were learning they were doing on their own," he said. "They paid for their own books and any equipment they could afford. I've been able to get some books from the Wateree Beekeepers so there is some consistency in what they're learning but this is not a state funded program so everything they use has been donated or the inmates have paid for it themselves. These guys have just done an amazing job. They work so hard and are so dedicated."

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The honey is sold to the LCI staff to fund the bee program.

Russell said working with the bees is worth the 30 stings he received one day because there is not enough protective clothing to go around.

"I didn't even feel most of them," he said. "I just love working the hives and plan to continue when I get out."

He, the other inmates I talk to, and prison officials all praise the volunteers who come to the prison to share their time and talents. "We have a lot of volunteers, not just at Lee but all over the state," Newsom said. "We couldn't have these programs without them."

And the programs are transforming the lives of the men who are serving their time in the state's prison system.

Chris says he will use the knowledge he has gained when he is released. "I have a daughter and grandkids," he said. "I'm trying to set an example, even in here. Just because we're behind this fence doesn't mean we're all bad people. A lot of us are people who made a mistake and we're trying to spend our time in here becoming better people."

In a nearby shop building, inmates are building frames and hives for their bees.

Kermit, another inmate, has been working with bees since the program began. "I love working with stock and animals," he said. "Without the bees, we're going to lose the earth and if I can do something to help, I'm going to. It's part of my religion and I love coming to the shop and working on the equipment. It helps pass the time, too."

Akbar said he wants to make a contribution to



Honey harvest.



Honey house.

society. "I have sons who have a lot of spare time and when I get out, I want to share what I've learned with them working with the bees," he said. "This is something productive and positive and I'd love to see more people in here get involved."

There are 384 of the prison's 1,375 inmates in the BLIC program, one that should be in every prison in the country.

In the BLIC dorm, "residents" leave their cell doors open and their lockers unlocked. They don't have to worry about anyone stealing from them.

There are book shelves on the walls, there is a microwave, a TV, showers with curtains and a table set up where a puzzle is being put together. Everyone speaks softly and is polite.

"If you want a man to act like he's free, then you have to treat him like he's free," Chris says.

There are talented men here. Garry is an incredible artist who discovered his talent when he was sent to prison. His murals decorate the walls and he hopes to somehow sell his art to fund a charity he wants to establish. He teaches art to the other inmates.

Leif is a master electrician and has created an amazing electrical wizardry board of gizmos from scrap parts. He uses that to teach other inmates so they will have skills when they leave LCI. The prison is getting ready to begin a cooking program that will be taught by a local chef.

In another room, there are several men playing guitars and a keyboard, practicing for an upcoming concert. They teach others how to play musical instruments.

All of the classes in BLIC are taught by inmates themselves. And there are more than four dozen offerings, everything from beekeeping to philosophy to Russian to woodworking.

Every 90 days every BLIC resident undergoes peer-to-peer review to see if he is meeting the community's expectations.

"It makes us stay accountable to the community," Chris explains. "We're allowed certain freedoms and we're responsible for behaving like free men. It's an opportunity we're grateful for and don't take lightly."

Cecilia Reynolds is the warden at LCI. **BC**

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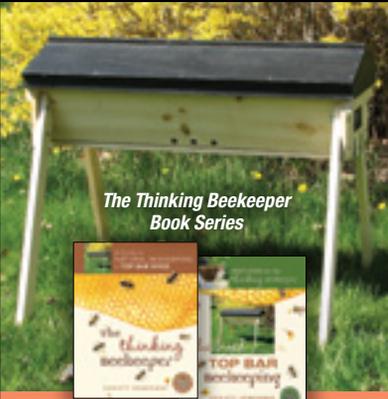
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MAKING INCREASE

A Comparison Of Different Methods Of Obtaining Honey Bees

Patrick Dwyer

Making increase is a fundamental activity of beekeeping whether one is a beginner beekeeper who purchases her first bees, a more experienced beekeeper who wants to replace lost colonies, or an established commercial beekeeper who proactively expands the number of colonies. There are a number of ways to accomplish this end and this article will discuss six of these methods that are utilized to support successful beekeeping.

The methods to be discussed include purchasing package bees, nucleus colonies, or established colonies as well as creating splits, performing swarm capture, or doing removals. For each method we will briefly define it and explain how it is performed and then focus on a systematic comparison with the other methods. Comparisons will include weighing the advantages and disadvantages of each including each method's "fun factor," difficulty, cost, as well as the contribution of other factors such as *queen quality*, *local adaptability*, *transmission of diseases and pests*, *Africanized genetics*, *feeding requirement*, possibility of *surplus honey* production, and *others*. I hope that this comparative analysis of increase methods will be of interest to both beginner and experienced beekeepers.

Package Bees

A package is a collection of several pounds of honey bees from multiple donor colonies shaken into a screened box without associated frames, combs, or brood but with an unrelated queen in a separate cage. Packages are generally produced in warm climates in the spring and can be shipped through the U.S. Postal Service or picked up at regional locations. Packages were a major method for increase in the 19th and 20th centuries including for Canadian beekeepers before the honey bee importation ban.

Installing package bees involves preparing a single story hive generally containing foundation, shaking the bees into the hive with a feeder, and allowing for the release of the queen after a brief period of introduction.

Advantages include a high *fun factor* as a beekeeper is able to observe all new colony activities including comb building, egg-laying, brood development, and the storing of nectar and pollen. At the outset this is a small colony that is easy to manage and ideally suited to beginners. The *difficulty* of installation is actually quite low, *queen quality* is generally quite good with a young, prolific queen, and *transmission of brood disease* is not seen.

Disadvantages include a significant *cost* (generally



Two recently installed bee packages.

\$90-140) and the fact that *local adaptability* is absent unless one's apiary is in a region producing packages and this contributes to a reputation of variable Winter survival. *Transmission of pests* might include small hive beetles and *Varroa*, *Africanized genetics* may be carried by these bees when shipped from certain regions, and these colonies generally have a *feeding requirement* for sugar syrup when installed. Production of *surplus honey* is uncommon during the first year unless packages are installed on drawn comb. *Other factors* include a significant risk of supercedure during the first year, infrequent problems with acceptance of the introduced queen, and the requirement to learn how to install the package but this is relatively easy for even beginners to perform.

Package bees always come from warm climates but beekeeping vendors and bee clubs are a source of these bees or they may be directly purchased through the mailfrom sellers.

Nucleus Colony

A nucleus colony ("nuc") is a small established colony generally with four to five frames of drawn comb containing brood, honey, pollen, and empty space for egg-laying, worker bees, and a queen. Nucs were an important in-apiary resource for Langstroth and Brother Adam and have become an important method of increase during the past quarter century.

Installation of a nuc into a standard hive is straightforward only requiring the transfer of combs and bees from the nucleus colony to the recipient hive generally with a feeder and frames of foundation.



Transferring frames from a nucleus colony into a hive.

Advantages include that the *difficulty* of installation is extremely low, *queen quality* should be good with a young prolific queen or an overwintered “tested” queen, and *local adaptability* could be a plus with locally sourced queens. A nucleus colony might produce *surplus honey* in the first season if it is installed in a standard hive early in the season particularly with drawn comb. As a nuc is already an established colony there are no problems with *queen acceptance* with this method.

Disadvantages include that the *fun factor* of installation is low, the *cost* is high to very high (\$125 to over \$200 for a “tested” nuc), and *local adaptability* may be unexpectedly absent even when purchasing from local beekeepers as nucleus queens are commonly reared in regions remote from where local nucleus colony sellers are located. Whenever used bee equipment is sold (such as with frames in a nucleus colony) there is a *risk of transmission of brood disease*, nucs also have a *risk of transmission of pests* including *Varroa* and small hive beetles, and nucleus queens from regions with *Africanized genetics* can also carry these. *Surplus honey* will not be obtained with small nucs and those installed late in the beekeeping season or on frames without drawn comb. *Other* disadvantages include that nucs are frequently a variable product that may contain old and damaged frames, new foundation, an old queen, a queen introduced just prior to sale, or no queen at all and nucs have a reputation as a method for unscrupulous sellers to unload unwanted combs from their operation.

Nucleus colonies can be obtained from many regional beekeepers and one should always ask about the quality of the product from trusted beekeeping contacts and consider asking an apiary inspector about disease issues.

Full-sized Colony

A full-sized colony is generally a single or double deep established colony containing drawn comb, brood, honey, pollen, bees, and a queen with complete hive equipment including bottom board, hive bodies, and top cover.

Installation of a full-sized colony involves moving it to a desired permanent location and in the absence of

heavy equipment requires some heavy lifting.

Advantages include that a locally sourced product could have *local adaptability* with a regionally reared queen, a low risk of *Africanized genetics* if located outside of a region with such genetics, generally the absence of a *feeding requirement*, a colony that is ready for *surplus honey* production in its first season, and *other* factors such as a ready pollination resource and the provision of full hive equipment.

Disadvantages include a low *fun factor* and a moderately high *difficulty* because of problems inherent in moving a large and heavy colony as well as issues for beginners such as difficulty finding the queen and the intimidation of learning from a large colony. The *cost* is higher than that of a nucleus colony, *queen quality* is commonly suspect with an older, less prolific queen, and *local adaptability* may be lacking depending on the source of the seller’s queens. There is also a real risk of *transmission of diseases and pests* including brood disease, *Varroa*, and small hive beetles. *Other* factors could include poor condition of hive equipment.

Full-sized colonies may be obtained from retiring beekeepers whose reputation for disease management is known with certainty and can also be obtained from almond pollinators after almond pollination is completed.

Split (Divide)

Splits, or divides, are the product of splitting or dividing an established colony into several colonies. Although such daughter colonies can make their own queen splits generally use a queen cell or mated queen. Splits have been an important in-apiary method of increase for established beekeepers for more than 150 years.

There are many procedures for performing splits including a “walk-away” split by dividing a populous colony with ample resources into two with eggs and larvae in both parts or more generally using a new queen in splits containing two to four frames of brood of all ages with covering nurse bees from a strong colony or several colonies.

Advantages of splits include a moderately high *fun factor* and low *cost* (\$0 to \$50). *Queen quality* can be a focus of this method with a young, prolific queen,



Moving full-size colonies.



Placing a queen into a split.

associated expected good winter survival, and the option of using hygienic or other pest-resistant queens or with queens with demonstrated *local adaptability* from regional queen breeders or one's own apiary. When using one's own frames for split creation the risk of *transmission of diseases and pests* is exceedingly low, in fact with predictable reduction in *Varroa* by dilution, out-competition by the explosive brood-rearing that follows splitting, and interruption of the brood cycle particularly when using queen cells. One might produce *surplus honey* in the first season if splits are well-provisioned (including with drawn comb) and created early in the season. *Other* favorable factors include decreased incidence of swarming in colonies donating combs to splits, probably fewer Winter losses, and the development of a self-sufficient sustainable apiary.

Disadvantages include that the *difficulty* of making splits is moderate for beginners and if using grafted queens from one's own apiary can be technically challenging even for experienced beekeepers. *Queen quality* issues include that an introduced queen might not be accepted, a potential for poor queen-rearing conditions particularly for "walk-away" splits, and questions about possible lower Winter survival if using one's own queens. *Local adaptability* might be an issue if purchased queens are not regionally derived, *Africanized genetics* could be introduced if queens are obtained from regions with those genetics, there is generally a *feeding requirement* for producing splits, *surplus honey* would not be expected unless an early-created split is well provisioned, and an *other* factor is that one should already have strong colonies to create splits limiting the application of this method to established beekeepers.

The source of inputs for splits generally include one's own bees and brood either with queen cells (including those produced by the beekeeper) or mated queens the latter of which are shipped from many suppliers or may be available locally.

Swarm Capture

Swarm capture as an increase method consists of capturing a swarm of bees when they first alight at their bivouac site or by placing a "swarm trap" ("bait hive") most commonly near one's own apiary or a source of feral survivor bees. Swarm capture is the oldest method of increase with skep and gum beekeeping dependent upon it.



A swarm trap (bait hive) in a tree.

If obtaining a swarm from a bivouac site where a swarm has temporarily landed, the swarm is generally shaken into a container and then poured into the new hive or on a bedsheet surrounding the hive and then fed with sugar syrup. If using a swarm trap a box is placed in an area near managed or feral colonies. Generally the beekeeper assures that the box has a size, location, orientation, odor, and other qualities that are attractive to bees as a nest site.

Advantages of swarm capture include an extremely high *fun factor* with gentle bees and the observation of all colony activities. The *cost* is free, the bees might have *local adaptability* if they are cast off of locally adapted bees, and there is no risk of *transmission of brood diseases*. An *other* favorable factor is that these bees are generally productive builders of new comb on provided foundation.

Disadvantages include moderate *difficulty* for beginners in hiving a swarm, the possibility of poor *queen quality* with an older, less prolific queen in primary swarms, and the possibility of poor *local adaptability* if the swarm is obtained near a commercial apiary or beeyards with queens imported from other areas of the country. A *feeding requirement* is expected for these excellent comb builders and *surplus honey* production cannot be relied upon in a swarm's first season. *Other* unfavorable factors include the possibility of selecting for "swarmy" bees, the difficulty of predicting when swarms will occur,

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An exposed colony during a cut-out.

poor Winter survival with late season swarms, and the risk of injury when retrieving swarms from sites not near the ground.

Swarms can be the products of one's own or others' apiaries, locations near feral survivor colonies, or beekeepers can publicize their willingness to serve as a community resource to retrieve swarms.

Removal (Cut-out)

Removals (cut-outs) of bees from a cavity in structures such as a house or barn or from a bee tree are also a method to obtain bees.

The procedure of doing a "removal" involves exposing the colony nest, removing the bees (sometimes with a bee vacuum) and the comb, attaching the broken comb into foundationless frames, and placing them into a recipient hive.

Advantages include low cost with free bees and the possible expense of a new replacement queen (\$5 to \$30), a possibility of *local adaptability* of bees that might be considered "survivor stock", and an *other* factor that beekeepers can charge for such removals and develop a potentially profitable business in doing so.

Disadvantages include that the *fun factor* is quite low (unless doing "bee lining"), the *difficulty* is quite high with significant time and labor involved, unanticipated carpentry challenges, and the potential for falls and power tool injuries. *Queen quality* may be poor with a generally older, less prolific queen and a significant possibility of requiring queen replacement. There is a significant risk of *transmission of diseases and pests* particularly for brood disease and *Varroa* and for this

reason quarantine is considered important by many who perform cut-outs. Generally there is a *feeding requirement* for removals after being placed in new equipment, *surplus honey* is uncommonly obtained during the first season, and *other* potential problems include dealing with crazy comb, increased defensiveness, and liability issues when working on someone else's property.

Referrals for removals are commonly obtained by word of mouth and by publicizing one's willingness to do these with fire departments, contractors, foresters, and tree surgeons.

Summary

There are a number of ways of either obtaining one's first bees or making increase in a beeyard including purchasing package bees, nucleus colonies, or established colonies as well as creating splits, performing swarm capture, or doing removals. Except for the creation of splits by those who do not currently have any bees any of these methods may be used depending on the assessment of the method's relative merits by the beekeeper.

While I believe that the *fun factor* and low risk of *transmission of brood disease* should always be emphasized, for beginners I prioritize a low level of *difficulty* while for beekeepers with established colonies I prioritize low *cost*. Thus, I recommend beginners purchase package bees from a region without Africanized genetics or small hive beetles and learn from these colonies. Nucleus colonies would also be very attractive for beginners if they were assembled by providers who are known to produce a high quality product, with locally adapted queens, and a high level of assurance that they are free of disease and pests. For beekeepers with established colonies splits are an ideal skill to make increase with one's own or locally adapted queens or with queens imported for desirable hygienic or genetic traits. Swarm capture, particularly from one's own apiary is also a cost effective way to make increase. **BC**

Patrick Dwyer is an EAS Certified Master Beekeeper who enjoys beekeeping in Otsego County, New York.

	Package	Nucleus	Estab. Colony	Split	Swarm	Cut-Out
Fun	✓			✓	✓	No
Low Difficulty	✓	✓	No			No
Low Cost				✓	✓	✓
Local Adapted	No	?	?	?	?	✓
Low Risk Brood Dz	✓	!	!	✓	✓	!
Other	supercede	variable product	transport	decreased swarming	swarmy bees?	carpentry

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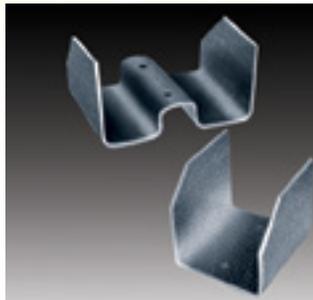
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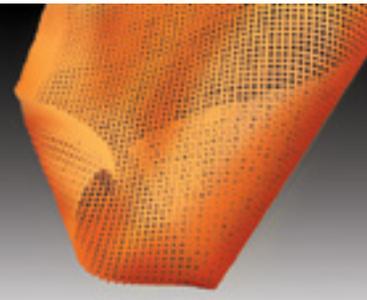
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Also see Phil's Bee Culture Q/A column in this issue.



CALENDAR

◆INTERNATIONAL◆

45th Apimondia International Congress will be held September 29 to October 4 in Istanbul, Turkey. For more information visit www.apimondia2017.org.

◆CONNECTICUT◆

The AHTS's Honey Tasting Course will be offered April 19-20 and April 22-23. For details and exact location of event visit www.Americanhoney Tastingsociety.com.

Back Yard Beekeepers Association 2017 speaker schedule – April 25, Frederique Keller; May 23, Christina Grozinger; 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, Mike Embrey, Maryann Frazier, Clarence Collison, Allen Hayes. For information visit www.easternapiculture.org.

◆GEORGIA◆

Queen Rearing Classes will be held April 28-29 and again May 19-20 at Honey Pond Farm in Comer Georgia. Jennifer Berry is the instructor. The cost for two days is \$300/student. Class size is limited. No experience is necessary. For more information visit www.honeypondfarm.com.

Beekeeping Institute will be held May 10-13 at Young Harris College in Young Harris, GA. Lectures, workshops and demonstrations from local, regional and national speakers will be held. There are also hands on training and honey judging and more. For more information visit www.ent.uga.edu/bees.

◆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/.

◆IOWA◆

LCBA Bee Seminar will be held March 18 in Mettawa at the Grainger Company. Speakers include James Amrine, Gordon Wardell, Jon Frank, Dave Hackenberg. For more information www.mettawabeeSeminar.com.

◆NEW YORK◆

The Art and Science of Honey Production, sponsored by Cornell Cooperative Extension of Madison County and Johnston's Honeybee Farm, at Morrisville State College April 22. Speakers include Lloyd Spears and Peter Borst. The

cost is \$45, lunch included. For information go directly (not a search) to tinyurl.com/honeyproduction or call 315.750.6963.

The Western New York Honey Producers will host the interationally recognized editor of *Bee Culture*, May 20 on the topic *10 Rules of Modern Beekeeping*, at Baker Memorial United Methodist Church. For more information visit www.wnyhpa.org.

◆OHIO◆

The Ohio State University Bee Lab Webinars will hold the third Wednesday of the month at 9:00 a.m. EST. April 19: Reduce Your Hive Losses Through Monitoring – Alex Zomchek. May 17: Setting Up Your Extracting Line - What's Needed? – Jim Tew. To join a webinar follow the link and log in about 8:55 a.m. – <http://go.osu.edu/theOSUbuzz>.

Geauga County Beginning Workshop, April 14, 7-9:30 p.m., Kenston Middle School, Art Room 231, 17425 Snyder Road, Chagrin Falls. The cost is \$45/family which includes a book about bees. To register go www.kenstoncommunityed.org or call 440.543.2552.

◆PENNSYLVANIA◆

The Capital Area Beekeepers' Association will hold its 30th Annual Short Course May 6 and 13. Part 1 at the Dauphin County Agriculture & Natural Resources Center, Dauphin, PA. Part 2 will be at Strites Orchard, Harrisburg. For additional information visit cabapa.org or contact John Novinger, 717.365.3215.

Delaware Valley University Queen Rearing will be held May, 20, 21 and 30. The cost is \$219. Vincent Aloyo is the instructor. To register contact 215.489.2436 or 215.489.4848.

◆VIRGINIA◆

Highlands Beekeepers Association will hold the 2017 Honey Bee Symposium April 18 at the Southwest Virginia Higher Education Center in Abingdon. Speakers are Jerry Hayes, Sam Comfort and Jerome Blankenship. The cost is \$40 includes lunch. For information contact 276.676.6309 or visit www.highlandsbeekeepers.com.

The 6th Annual Mid-Atlantic Organic Honey Bee Convention will be held July 15 at American Legion Post 242, 21 J.B. Finley Road, Sandston. The cost is \$50/person or \$90/family. For more information visit www.maohbc.com.

◆WEST VIRGINIA◆

The WV Beekeepers Association will hold their Spring Conference April 21-22 at Oglebay Resort in Wheeling. Speakers include Jamie Ellis and Phil Craft. A block of rooms at the resort has been reserved. Must book by March 21. For information contact Steve Roth, 304.242.9867 or visit www.tristatebeekeepers.com.

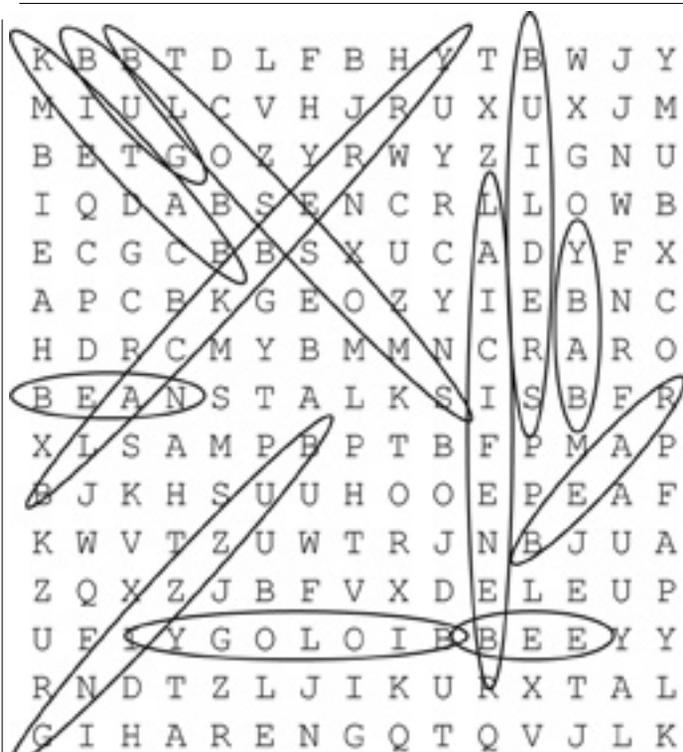


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Paul and I depart in the teeth of a snowstorm. Over Vail Pass, up the long hill to the Eisenhower Tunnel, no problem, then down to Denver the Mile High City, now South, bound for Texas, where the cotton blooms and blows. We pass semis tipped over by savage winds. We charge ahead, headed for Galveston and the granddaddy of 'em all, the North American Beekeeping Conference.

At midnight we check into an Amarillo motel I wouldn't recommend. I learn how Paul gets up. When the alarm sounds, he leaps. We're on the road a little after six.

In Houston rush hour traffic, Paul misses a turn and heads off in the wrong direction. I use a dog-eared road atlas to guide us back. Paul and I are not smart phone or GPS people. We have no apps. We're from another century.

Early evening in the fog, we park in front of the convention center, surf pounding in our ears. Toto, we're not in Colorado anymore! We register. We run into friends and beekeeping rock stars alike.

Paul and I walk down a pier to check out the fishing opportunities, then head for my Airbnb at the other end of town. Eight steps up from the yard, just below the front porch, a plaque reads, "High water mark, Hurricane Ike, 2008." Inside, high ceilings, narrow stairways, creaky old polished oak floors, a shared bath. Paul has reservations at the Red Roof Inn, but tonight he's on the rollaway in my room. Downstairs an arty poster catches my eye – smiling topless lady on a Harley, hair streaming in the wind. She's not wearing a helmet.

The North American Beekeeping Convention is a joint meeting of the American Bee Federation (ABF), the American Honey Producers Association (AHPA), and the Canadian Honey Council (CHC). I'd never been to a national bee meeting. I did go to Apimondia, an international meeting, in Ukraine. It was a lot like Galveston – huge tradeshow and an infinity of speakers, some better than others. But in Galveston we heard the best and the brightest, in intelligible English.

At the trade show I got to talk to the manufacturer of my pollen traps. The first batch I bought work just fine, but a later, similar model captures less than half as much. The reps acted interested.

I spoke to vendors of certain mite control products and explained my frustrations.

When I told the owner of a bee supply house that I switched to another company because of shipping delays, he told me, "Just use my name, and you'll go to the head of the line!" Well, that's all very fine for me, but I really didn't tell him that so that I'd get preferential treatment.

I skipped the Flow Hive demonstration, even though I agreed to tend bees this year for a wealthy client who has already purchased four of them. Whenever I think about the Flow Hive, my mind recoils, like it does when I think about nuclear war, or global warming, or my delinquent tax filings.

I especially enjoyed Marla Spivak's presentation on the conversion of the state of Minnesota to the nation's most pollinator-friendly state, with even the governor coming on board.

Former USDA top bee scientist Jeff Pettis gave the low-down on getting kicked downstairs in government when you step on sensitive toes. He got a standing ovation, and right after, when commercial beekeeper Dave Hackenberg gave his Jeff Pettis eulogy, applause shook the rafters.

I learned that, among commercial beekeepers in general, there is plenty of concern about neonicotinoid pesticides. This got my attention, because here in Colorado the commercial guys pooh-pooh neonic dangers. Well, some do. Well-documented losses by commercial beekeepers from other states get dismissed as "PPB," or "piss-poor beekeeping."

At the commercial beekeepers' breakfast a big topic was mites developing resistance to amitraz, the commercial go-to miticide. As this chemical declines in effectiveness, beekeepers find they need to treat more often. I heard that mite-ridden bees constitute a major problem for neighboring beehives. Afterwards I talked about that with ABF president Gene Brandi. He compared it to owning a dog. If your dog had fleas, you wouldn't withhold treatment and just let your dog spread those fleas to other dogs, would you? I know. In the long haul, chemicals aren't the answer. But in the short run, they keep us in the game. When your house is on fire, the short run matters.

At a roundtable we talked about the 2017 EPA directive requiring a veterinary prescription to obtain antibiotics for American foulbrood. I can tell you that confusion reigns, partly because so few vets have any experience with honey bees. Consensus: You might want to consult with a vet *before* you decide you need antibiotics. The law is the law, but relationships are the grease that makes the world work.

I acted brave and talked to strangers. Whenever I got lonely, the Kansas contingent took me in. I'd look around, thinking "Who am I going to go to lunch with?" and Joli and Becky would appear out of thin air, inviting me back to their rental house for pickles and Steve's home-smoked turkey sandwiches.

The best part of all was the people. Beekeepers, salt of the Earth. I felt happy just being among them. You would, too. The ABF, AHPA and CBC are all organizations that promote bees and beekeeping. You ought to join one. I did. Hell, join 'em all! Then you could go to conventions. And if you bump into me at one, maybe we'll go to lunch.

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