THE INTERVIEW ISSUE

ROOT PUBLICATIONS

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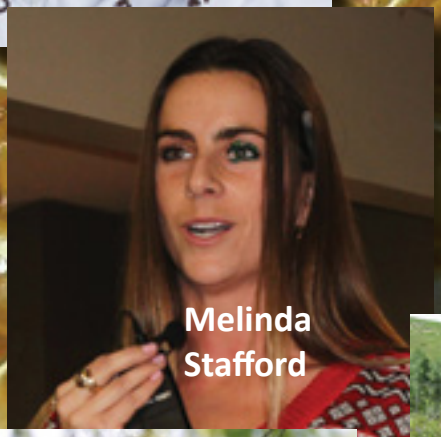
Melinda Stafford


Christina Grozinger


Paul Limbach


Mikaila Ulmer

Winter, 1995. On Christmas Eve, our girl dropped off honey gifts to neighbors. Today, she has an entire line of honeys to deliver.

For us, running a bee operation is inconceivable without love for the bees. Raising and caring for healthy queen bees and hives is learned from generations of master beekeepers. Healthy honeybees produce the best honey, and removing honey from hives is imperative for hive health. Raising future bee enthusiasts provides the opportunity to continue this historic practice, and also to find new ways to grow the industry, such as producing bee products. Generational beekeeping starts with family values to assure the future of every living creature. **LEARNING FROM THE BEST.**
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Bee Culture

December Features . . .

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It's Bee Culture's Interview issue – lots of interesting folks in this issue.

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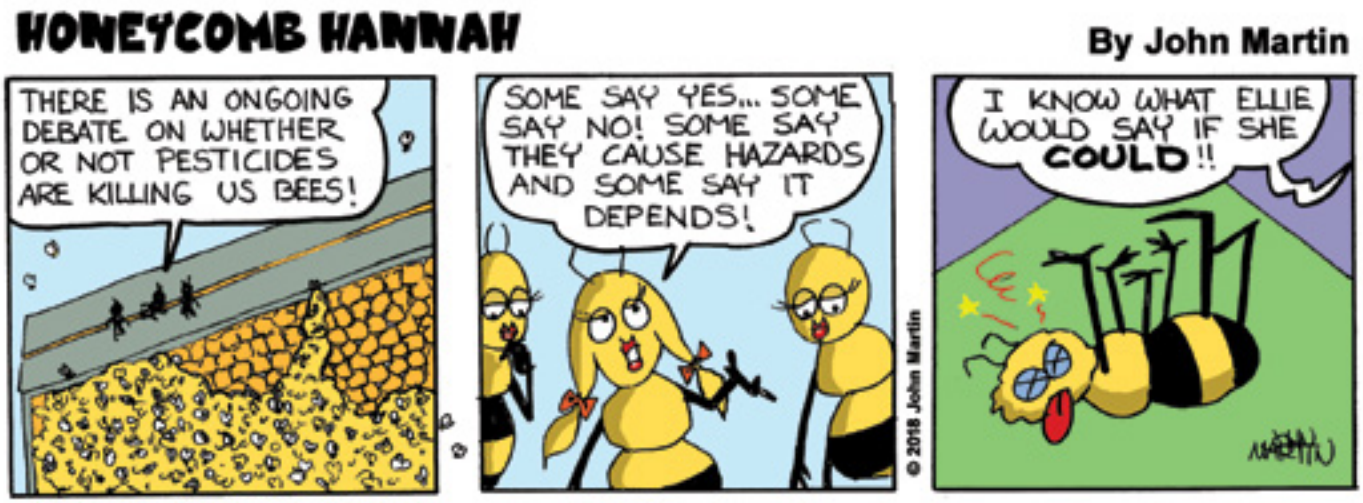

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The Podcasts!

Just a note to let you know I love the podcast. I'm a mechanic by trade (part time farmer) and with three kids have very little time to read the magazine (I try) or go to the website or such. But I do have time to listen to podcasts, so for me, this is a perfect opportunity to keep up with the available time I do have. So thanks, and I'm looking forward to future episodes.

I do like the format, focusing on interviews, you've been doing so far.

Luke VonderOhe
Roseville, CA

To hear the podcasts visit **www.beekeepingtodaypodcast.com**.

My Story

Tim and I really enjoyed our weekend in Medina.

We even took the candle factory tour – fascinating.

We had a great time. Thanks.

Yves Garez
Nipawin, Sask

•

I'm writing to thank you for bringing together the four commercial beekeepers for "My Story." With 30+ years of experience I thought I had a pretty good grasp on beekeeping's ups, downs, dos, and don'ts. The shared knowledge of the four taught me so much more that will help me with my beekeeping. The two days of sharing experiences is something I will be talking about for years. Thank you again for a great conference.

Jeff Ludwig
Byron, IL

Save Bees With Mushrooms!

Hello friends of the honey bee, I write today bearing interesting news coming from Washington State. The article is titled "'Long Haired Hippie' could help save the bees with mushrooms" by Evan Bush of *Seattle Times*. Paul Stamets (my local mushroom hero!) witnessed his bees convoying back and forth to patches of mushrooms he was growing. The bees even moved woodchips to access the branding fibers of fungus beneath the surface of the mushroom patties. Mushroom mycelium has sugars and anti-viral properties, Paul notes. In research published Thursday October 4th the *Journal Scientific Reports*, Stamets turned intuition into reality. The paper describes how bees given a small amount of his mushroom mycelia extract exhibited remarkable reductions in the presence of viruses associated with parasitic mites. Steve Sheppard, Washington State University entomology professor, is working with more than 300 commercial colonies in Oregon for his experiments. There will be an extract subscription service available next year.

As for the rest of us beekeepers here at Larch corrections center, we meet every week with our faithful bearded mentor from the Clark County Beekeepers Association to learn and share. This has literally been the coolest thing I've done for the last two years of my life. We split our couple of hives and left one to produce honey this year. Last year's crop was mostly fireweed, very floral taste and smelled flowery

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but this year's crop was salal (up here at 1300ft). This thick buttery honey is the best I've ever had. To add description, a small finger full, coats the inside of your mouth like molasses but its flavor profile sets in like an afterthought. Candy made from flowers is the best way I could describes it I guess. The officers here wouldn't let us bring a drop in the gate which sucks because they sell honey in store? It cost $3.10 for a honey bear of dark clover honey that taste strongly metallic. An American label proudly states "Packaged in the USA" by some express company. I wonder if the "Express" part is how fast they are making money on us! I think by packaging the cheapest product possible and putting USA all over it really says we as American's will eat crap as long as it's cheap. A cheap American label printed on the cap it says prod of Ar/Vn/In. I make the best out of what I have built to last with quality in mind. Maybe I should buy cheap gaskets from China and sell them "package and

mailed in the USA! Grade A…"

Put the phone down and get back in the dirt and make the world a better place. Eat fresh and in its season and quit letting cheap be the reason.

David Hanigan
Yacolt, WA

p.s.

I love the magazines you send every month. I'm always touched by one thing or another. The beekeeping community is very unified and caring. Success stories and even gleanings all remind me that doing the right thing matters – even if nobody sees it.

References
The News Tribune October 7th (Sunday) pg. A4

Great Gift Ideas For Your Beekeeper –

Honey Bee Charli, by Melissa Haskins Wilbanks. Published by Mascot Books. ISBN 978-1-63177-990-0. 10" x 8", 32 pgs., hardcover, full color. $14.95.

Yes, that Wilbanks. Melissa Haskins Wilbanks is married to Reg Wilbanks, commercial beekeeper and queen producer, so it is no wonder this children's book has bees as the characters of this story. The author has been a teacher for over 25 years, and has a strong relationship with the children she teaches. And this book is about children, and parents. The child is a honey bee of course, and Mom is the Queen. But this isn't honey bee biology. It's about Parenting, teaching, growing and learning. The illustrations are easy to look at and certainly make the story easy to read with a child. And everybody will enjoy the friendly bees, the flowers and the story in particular. – *Kim Flottum*

Bees Life Necklace – This uniquely crafted necklace is a visual representation of the amount of honey a bee makes in its short life. A honey bee lives for four to six weeks and can produce 1/12th of a teaspoon of honey. This necklace bulb holds exactly that 1/12th amount. Use as a visual display in a classroom or proudly wear it to support a special creature we adore. Send to a special friend.

To purchase for $10/each go to **www.ecobeebox.com** or **www.ecobox.net**. Comes in a men's cord or a lady chain.

A Welsh Beekeeper from the UK has developed a "Virtually" sting proof suit called the "Sentinel Pro 3D" aimed at Beekeepers who suffer from Anaphylaxis and wish to continue with their hobby.

A beekeeper and farmer, Ian designed the suit when a colleague became seriously anaphylactic and was forced to give up beekeeping. Having found a suitable material in Europe the design went through several months of trialling and testing before launching in March 2018 at a prominent Beekeeping Convention in Wales.

The suit is made from a 3D breathable material and weighs under three lbs, its unique clear mesh is used in the Fencing Veil (a little deeper than most to prevent bees stinging your face) and Retro Hat which are interchangeable with each other on the suit, it also has lots of interesting features, two lined hive tool pockets one on each leg, zipped mobile phone breast pockets, strategically placed hip pockets, built in knee pads and even a little pocket on the sleeve for a queen marking pen, a torch or an EpiPen. The sentinel Pro has YKK Zips with ease of use ring pulls for the veils, hats and main body, and there are zips at the ankles to help put on and pull off the suit.

The suit is extremely light and comfy to wear, its very flexible and in the heat of the summer the 3D breathable material keeps you surprisingly cool. The material of the suit is is very strong and will not tear easily on brambles, thorns etc, its 3.5 mm thick and a bees sting is between 1.5 mm and 3 mm long, knowing this, your confidence is automatically boosted particularly if you suffer from an allergy, bearing in mind a traditional bee suit is after all just a set of cotton overalls. The suit also eliminates wearing lots of additional clothing for protection underneath.

To accompany the suit Old Castle Farm Hives have produced Sentinel Pro 3D Ventilated gloves and gauntlets to match and the suit comes in two colours a modern grey or traditional white. The suit is available in a variety of different sizes, and make "Custom" sizes also, it is machine-washable and dries quickly.

Visit **www.oldcastlefarmhives.com**

As with many creatures, Honey Bees have a communication system of their own. The question is, can we understand their language? Likely not, until now. Most beekeepers know colonies can hiss, queens can pipe & workers do their waggle dance. But did you know there are many other sounds that the colony can make in order to communicate? Colonies warble, wave, moan, crackle, plead, quibble and rip a quilt. The Bees are always communicating with each other. We just don't know how to interpret their detailed communication system, until recently. What if we could "listen in on" their conversations? If we could "eves drop" in on the colony, I wonder what we'd learn? Does such a tool even exist?

Yes! It's called the "Apivox Smart Monitor." This is a multi-function "listening app", able to interpret the colonies communication and then translate this information back to us, in the form of dials and graphs. Not found in traditional app stores. Custom written to your Android device; cell phone or tablet. Apple IOs is too restrictive for recording sounds, sorry. A 4gb download. Comes with a detailed Operators Manual. Using a Bluetooth ear piece, slipped into the porch opening, synced with your device and the Apivox app. Apivox is a standalone app, no need for internet connections.

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If you'd like to learn more about the Apivox Smart Monitor; Cost is; $40 and can be ordered through **ApivoxAuditor.com;** Developers website; **ApivoxAuditor.com.**

Developers name; Serjio Glebskij

Our website; **www.littlecreek-beeranch.com/Apivox-Auditor.html**

If you have further questions, you can reach me at; **kadyscout@aol.com** or my cell phone 918-798-2251, if you text, please include your name.

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The Beehive Awning design consists of: 18-Gage cold rolled steel panel, 16.25in. x 4 in. (bent 10º at 1 in. from the top), Powder-Coated, sky white, (extra strength powder coating for outdoor use) and Stainless Steel (no. 8) - 1/2 inch screws (3)

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CORRECTION

In the New Products section in our November issue we left did not include the website for the Easy On Hive Covers. It is **www.easyonhivecovers.com**.

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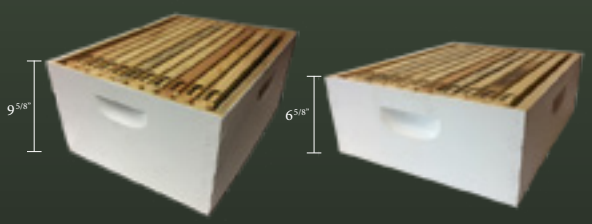

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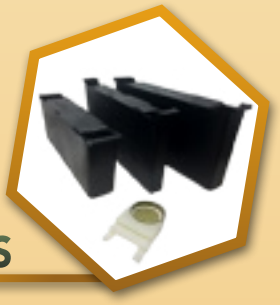

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INNER COVER

I like to think I have a green thumb. Actually, on a good day, I like to think I have 10 green fingers. Way back when, I accidently discovered the world of greenhouses, apple orchards, turf farms, home gardens and lawns and even more. Once discovered, I got good at it fast because to get the job that would give me all the experience and training I needed, and wanted I told the College Professor who hired me I actually had some experience and he could rest easy now. So I got good in a hurry.

In fact, I got so good the USDA noticed and offered me a job doing, what else, growing things. But to get that job I had to learn about bees. And that changed things. My green fingers got covered in honey and wax and life moved on. And here I am.

I still have 10 green fingers though. And, like I offered one of my bosses here a few years ago, I could grow petunias or cotton on your living room carpet if your wife didn't mind the wet spot. So at home we have a lot of plants. The yard has lots of landscape plantings of shrubs and trees and vines and annuals and perennials and wild pollinator gardens, all native and all picked for bees or birds or both. And just because, there's blackberries, raspberries, elderberries and asparagus, and until last summer a few apple trees. And then there's the garden with all the garden things that should be there – peas and squash and melons and tomatoes (12 kinds), peppers (10 kinds), a bunch of different beans and herbs, cukes and even some flowers for bouquets. We grow way more than we can eat and give a lot of it to folks who have just regular fingers.

And then there's the deck out back. It's foot print is the same size as the foot print of our house. It's on two levels, half and half for square feet. The upper deck walks out of the dining room and there's a staircase on one side going down five steps to the lower level. There's a firepit thing we use once-in-a-while on the lower deck, chairs, tables and plant stands and shelves for plants and lots and lots and lots of flowers and cuttings and herbs and the like on both. There's walls and lath on two sides to keep the neighbors at bay, and we hang pots with special pot holders every place that's empty and fill them with hanging flowers, and on top of all those walls and screens there's more pots with flowers.

On the edges and sometimes in the middle there are jade trees a yard tall and a yard wide, hanging philodendrons seven or eight feet long hanging from the eaves of the garage which encloses one side of the deck, dracaenas over eight feet tall, elephant ears six feet tall and a yard or more wide, wandering Jews five or six feet long, landscape begonias in pots five feet tall and a yard wide, and flowering cactus all over.

And when we do the garden seeds in late winter, we always do more than we need or have room for in the garden, just in case, you know. So when the garden is in, there are always leftovers, and it's a crime to not plant those Sweet One Hundred cherry tomatoes somewhere, or those extra jalapeno or poblano or hot chili peppers somewhere else, so they go three in a great big pot and they, too, sit on the deck all around the edges, both inside and outside the lath, forming kind of a soft, green horticultural buffer enclosing us even more. So all summer long we can sit by the fire on warm summer evenings, munching on sweet cherry tomatoes, sweet peppers of some kind or a great big Mortgage Maker tomato all night long. All told, by the 4th of July there's over 350 pots of all kinds of plants on or near the deck that give us food, color, shade, cut flowers, just flowers, or herbs or just plain leafy, frilly green plants. Is this an obsession?

I actually spend more time taking care of plants than I do bees in the summer, but not much, and it isn't work. Watering, feeding, transplanting, pruning, moving – 10 green fingers.

The bee work is pretty much done by the end of October – harvesting, wrapping, wintering, screening. Then the Winter plant work starts.

Of course the veggies are done by November 1, but those Jade and philodendrons and cactus and begonias aren't hardy, and aren't done, so they all get brought inside. This year we have 245 pots in the house. Forty five on the first floor and the rest in the basement, under a couple dozen florescent and LED light fixtures.

There are two small rooms in the basement. One has the furnace and can be closed off, and the other was meant as storage and it, too can be closed off. The two rooms are on one side of the basement, with a brick wall separating them. The furnace room has 35' of bench space 2' wide with lights above, that hold most of the smaller plants, and there's another bench in the open room that's 8' x 3' wide that takes a bunch of medium plants, and there's the sump pump corner that about a dozen really big plants sit around, and we have a kid's swimming pool that all those hanging plants hang over. The single faucet in the basement is right next to the sump pump.

The Right Tool.

OK, why all this about plants? There's a good reason, actually. To water all those plants some time ago I ran a hose from the sink in one corner near the sump, along one long wall, under the platform that holds the freezer and my antique extractors on the short wall, under the wall into the furnace room. The hose I chose long ago was chosen because it had been outside for a season, and it was a piece of crap. Both ends had some kind of plastic sleeve on it that made it impossible to attach it to anything – faucet, nozzle, sprinkler – easily, and then, it always, always leaked. On both ends. And it was too short to be really useful on a deck that had been enlarged that year. Being outside that wasn't critical, but it was messy and inconvenient and heavy duty so difficult to. Get rid of it was the easy decision, even though it was expensive and almost new.

So I made two bad choices. I kept it, and instead of leaving it outside, I took it to the basement. Up to that Summer, all my water came from a cistern – rain water, or delivered in a truck. So water use was always frugal. Short showers, garden water only at night and then as little as possible, you know the game. But once city water was hooked up, water was essentially free (not quite, but it was easy), so instead of saving rain water all Summer in kitty litter jugs to be used all Winter in the basement, I could hook up a hose and do it all.

But that hose wasn't any better inside than out, and leaks and mess were the name of the game. And it was too short in the basement to reach all the plants, so I still had to use a watering can for a lot of them. And I bought that hose to eliminate that exact task.

But, and this counts, the basement in this house had leaked since the day it was built, over 85 years ago. It was always damp. So a little damper, especially during the dryer Winter wasn't really a problem. But that Summer we fixed that damp. My neighbor that Summer did some landscaping to his lawn to try and fix his wet basement, failed miserably (don't ever hire an accountant to do drainage, like he did), but made my damp basement much, much worse (and his, too. Not a lot of pity from me on that). So I hired a drainage expert, he laid out a plan, I doubled it, and since that day, not a drop of water in the basement. Not one. Except for that hose.

The wrong tool for all the wrong reasons. I'd kept using it because it was too expensive to discard, I'd chosen it so there was this pride thing involved, and spending more to fix the problem was even more expensive. But at what cost? Frustration, time, time, frustration, and always a mess. Not sure how much frustration costs, but you can measure time by the dollar.

So that's what this is about. For whatever reason, using the wrong tool costs you more than replacing it with the right tool. Think about what you do with bees every time you do bees. Smoker too small so you have to stop and refill. Dull hive tool. Truck too small so you have to make two trips. Bee suit with a hole in it. Extractor too small so you have to stop too many times to load and unload. Drain in the floor runs too slow. Only one light in the florescent fixture so can't quite see to get everything really clean. Bee escape in the window plugged and bees can't get out. Mirror on the passenger side busted so can't see anymore. And the taillight is out. Six inches of gunk on the warehouse floor. That one beeyard that just doesn't produce any more, but truck's too small to move it just now. Gate lock broken so have to jury-rig it every time. Driveway into that new beeyard still too muddy and get stuck five times out of 10.

When you don't have the right tool everything that can go wrong, will go wrong, sooner or later. Too often it is always going wrong, but it means money and time and work to make it right. Of course making it right saves money and time. Take an hour this month and take a look at everything you do, and have to do twice and how can that be fixed. The right tool for the job is the smarter way to go. but you knew that.

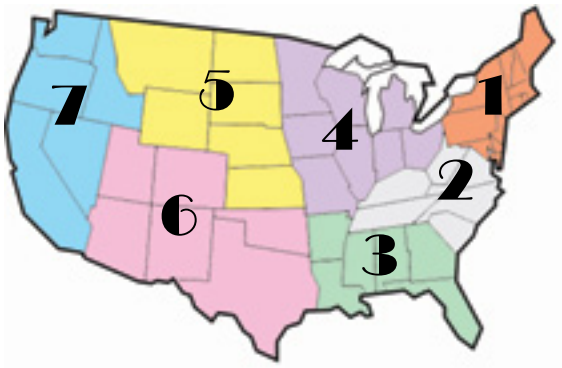
•

Take a look at the Monthly Honey Report this month. We went back and got the numbers from last December, like we always do, so you can compare what was a year ago to what is today. With only a couple of exceptions, prices are up just a tad, which is promising. However, note that though these prices are about even, what in your operation is as stable? Income the same, costs are – the same? I'd wager not. Stay tuned to next month's International Honey Report, which will shed even more light on whats's going on and why.

•

It's Christmas and New Year's Holiday. Take some time with family and friends. *Bee Culture's* had a pretty good year after several with some amount of stress and churning. We hope you and yours are doing well and that next year is even better. Merry Christmas and Happy New Year!

DECEMBER – REGIONAL HONEY PRICE REPORT



We're throwing a lot of numbers at you this month but we think you'll find them useful. Below is our monthly report from December 2017 and below that this month's report. You can see the difference for each product over the course of year, by region. You can look at yours and see what's happened over the past 12 months. One thing to consider looking at these two reports is that they are actually very similar. Some regions fluctuate more than others but overall they are about the same. What else in your operation is the same, however? Supplies, gas, packages or nucs, labor, fees? What is going up is wax and pollination, what isn't going up is honey. We should be measuring the change in bees. Maybe next year.

REPORTING REGIONS - 2017 SUMMARY

	1	2	3	4	5	6	7	Range	Avg.	$/lb	History Last Month	History Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.08	2.16	2.23	2.28	2.23	2.20	3.00	1.50-3.00	2.23	2.23	2.24	2.19
55 Gal. Drum, Ambr	2.20	2.12	2.06	2.22	2.17	2.06	3.00	1.35-3.00	2.17	2.17	2.14	2.06
60# Light (retail)	227.86	182.85	177.80	203.15	159.00	196.74	220.00	103.98-280.00	199.89	3.33	195.40	203.63
60# Amber (retail)	230.94	192.07	192.12	191.55	200.60	194.43	226.67	122.69-270.00	204.85	3.41	191.82	202.11
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	99.23	75.38	88.80	69.80	72.00	84.00	91.34	60.00-134.40	85.48	7.12	84.76	84.80
1# 24/case	141.49	107.15	127.92	112.48	127.16	124.88	128.40	86.40-211.20	126.50	5.27	126.27	127.53
2# 12/case	124.74	95.07	111.41	98.03	97.44	98.40	114.00	70.00-192.00	110.74	4.61	109.22	117.04
12.oz. Plas. 24/cs	108.28	87.67	91.50	88.25	74.40	104.00	97.20	66.00-172.80	96.28	5.35	94.03	99.48
5# 6/case	142.46	108.25	142.00	108.75	102.30	115.50	133.57	71.50-210.00	126.38	4.21	127.53	125.49
Quarts 12/case	172.11	134.43	134.51	129.80	155.32	130.62	132.00	109.20-216.00	141.27	3.92	153.10	142.72
Pints 12/case	108.98	88.73	77.67	75.00	111.00	73.98	84.00	65.00-120.00	87.38	4.85	96.02	89.21
RETAIL SHELF PRICES												
1/2#	5.96	4.33	4.70	3.84	3.84	3.85	5.31	2.69-9.00	4.77	9.53	4.96	4.74
12 oz. Plastic	7.19	4.96	5.29	4.58	4.56	6.44	6.30	3.79-12.00	5.81	7.74	5.80	5.75
1# Glass/Plastic	8.30	6.61	7.46	6.19	6.51	6.66	8.75	4.00-14.00	7.34	7.34	7.37	7.75
2# Glass/Plastic	14.44	9.68	12.48	10.76	11.52	9.87	15.00	6.00-21.00	12.37	6.19	12.40	13.03
Pint	13.32	9.55	8.67	10.88	10.00	10.69	11.13	7.00-18.50	10.19	6.79	10.17	9.84
Quart	19.87	16.52	15.28	15.54	17.48	16.46	19.24	9.25-32.00	17.15	5.72	17.31	17.13
5# Glass/Plastic	28.95	24.42	35.31	23.83	25.19	22.50	35.00	16.99-43.25	27.28	5.46	28.03	27.74
1# Cream	9.78	8.47	11.25	8.41	9.88	5.50	9.67	5.50-16.00	9.23	9.23	9.91	8.68
1# Cut Comb	12.79	10.68	9.00	8.45	10.00	9.25	14.00	5.00-24.00	10.67	10.67	11.59	11.08
Ross Round	10.49	6.83	9.94	9.75	9.94	10.50	8.40	6.00-15.00	9.37	12.50	10.36	9.68
Wholesale Wax (Lt)	8.20	5.10	5.60	4.50	6.00	5.15	5.00	3.00-12.00	6.01	-	6.21	6.17
Wholesale Wax (Dk)	7.75	4.75	4.46	4.14	6.19	3.17	5.00	2.00-12.00	5.39	-	5.56	5.60
Pollination Fee/Col.	96.67	70.00	66.25	77.50	80.00	90.00	76.67	30.00-150.00	81.30	-	80.00	85.81

REPORTING REGIONS - 2018 SUMMARY

	1	2	3	4	5	6	7	Range	Avg.	$/lb	History Last Month	History Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.41	2.15	2.45	2.56	2.25	2.15	3.00	1.74-3.25	2.32	2.32	2.16	2.23
55 Gal. Drum, Ambr	2.17	2.10	2.07	2.42	2.17	2.05	2.75	1.35-3.00	2.16	2.16	2.06	2.17
60# Light (retail)	222.87	181.75	188.75	207.55	177.00	193.94	220.00	150.00-325.00	208.24	3.47	193.41	199.89
60# Amber (retail)	221.71	182.80	187.50	203.55	221.71	188.75	227.50	143.74-325.00	209.05	3.48	191.57	204.85
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	93.01	74.33	90.80	67.00	57.60	84.00	93.01	57.60-144.00	85.21	7.10	86.86	85.48
1# 24/case	127.39	106.87	126.37	118.63	115.44	104.91	136.20	45.00-211.20	126.67	5.28	128.45	126.50
2# 12/case	125.14	95.63	116.05	111.44	97.44	104.40	114.00	78.00-192.00	115.27	4.80	114.31	110.74
12.oz. Plas. 24/cs	114.03	101.20	88.00	89.14	78.00	124.00	103.20	53.99-196.00	103.07	5.73	98.77	96.28
5# 6/case	134.96	110.00	133.66	120.58	107.28	115.50	134.96	71.50-210.00	129.17	4.31	128.19	126.38
Quarts 12/case	174.37	149.00	131.01	163.30	132.00	139.48	144.00	109.20-280.00	154.13	4.28	146.33	141.27
Pints 12/case	102.46	93.44	74.17	107.33	102.46	84.08	84.00	65.00-160.00	92.42	5.13	96.14	87.38
RETAIL SHELF PRICES												
1/2#	5.22	4.26	4.70	4.45	4.41	3.54	7.00	2.08-9.00	4.90	9.80	5.07	4.77
12 oz. Plastic	6.16	5.22	6.11	5.68	4.72	6.13	6.93	2.68-10.00	5.99	7.98	6.12	5.81
1# Glass/Plastic	8.28	7.22	7.41	6.63	6.72	6.56	9.08	4.00-14.00	7.56	7.56	7.59	7.34
2# Glass/Plastic	13.22	10.55	13.18	11.92	12.57	9.48	16.17	6.40-21.00	12.73	6.37	12.88	12.37
Pint	11.17	8.93	8.12	11.64	8.38	10.01	10.47	4.00-21.00	9.85	6.56	10.20	10.19
Quart	20.30	17.19	15.23	14.80	16.28	17.66	20.69	8.00-38.00	17.61	5.87	16.38	17.15
5# Glass/Plastic	29.74	25.00	36.50	28.20	23.03	22.85	29.74	15.00-48.00	27.97	5.59	26.17	27.28
1# Cream	10.09	7.97	8.00	9.40	8.47	8.50	10.50	6.00-16.00	9.17	9.17	9.53	9.23
1# Cut Comb	13.60	8.88	10.49	10.80	15.50	10.50	14.00	6.00-24.00	12.20	12.20	11.99	10.67
Ross Round	9.61	6.77	9.61	9.00	9.61	10.50	12.49	6.50-13.00	9.48	12.64	8.88	9.37
Wholesale Wax (Lt)	7.89	5.15	5.42	6.58	6.00	4.83	9.80	2.60-15.00	6.99	-	6.54	6.01
Wholesale Wax (Dk)	7.34	4.83	4.39	5.72	7.34	3.33	10.00	2.50-15.00	5.93	-	5.48	5.39
Pollination Fee/Col.	90.35	73.75	58.75	85.00	90.35	92.00	89.00	30.00-160.00	85.69	-	90.45	81.30

It's Summers Time –

Time Flies

The years sure seem to go faster, the older I get. And every year we never get it all done. But we just keep trying as hard as we can and dancing as fast as we can. I can honestly say we all do the very best job we can do with the tools and staff that we have.

All in all 2018 has been a pretty good year here at *Bee Culture*. We've added two new people to our team and that has helped us to catch up on some things that were lagging and be ready to press on to several big projects for 2019.

Kelsey joined us almost exactly a year ago. She's the youngest member of our team and full of energy and eager to learn new things. If you call with a question or to subscribe it's most likely going to be Kelsey that you talk to. She answers the phone for us, answers email, helps Amanda with subscriptions, does the mail and she make me laugh everyday. We are so happy to have her with us.

We also have Brenda new to the team. Brenda has been in the beekeeping industry for several years and is now doing our layout and design for the quarterly publication *BEEKeeping, Your First Three Years*. She is working remotely from her home in Minnesota. Thanks to today's technology it's pretty easy to make that happen. She has been able to visit Medina a couple of times since coming on board. Brenda was here to help us out with our 'My Story' event in October.

The rest of the team remains the same. Starting with Kim and I, the old folks of *Bee Culture*. We were just talking about our years here and figure cumulatively we have around 70 years experience with the magazine. We've seen a lot of changes, mostly for the better. We're still enjoying the work here and looking forward to finishing some things, so we'll be hanging around for a little bit longer.

Of our writers Jim Tew, Clarence Collison and Ann Harman were all writing for *'Gleanings' In Bee Culture* before Kim and I started our journey. And they are still at the top as far as popularity. We treasure them and hope they stick around for a while too.

The Bee Culture *team taking a break during the 'My Story' event - Amanda, Jean, Johnny and Kelsey.*

The room was full for 'My Story.' Stay tuned for next year's event details.

Then we have Jean who is our Advertising Coordinator and continues to do an amazing job of reaching out to new and current advertisers. She's always searching for new directions to go. And she's only doing this part time for us. In Jean's other life she is a dispatcher at a local hospital. She is one busy lady and we are so glad she finds time to be with us. Jean is not only a co-worker but a treasured life long friend.

Amanda is our Subscription 'guru'. She knows all and sees all that has to do with our subscription program. She takes care of our Facebook and Social Media stuff and organizes our annual events and Pollinator Day each year. In other words she takes care of the detail stuff and tries her best to keep the rest of us organized. That's a tough job! And she also makes me laugh everyday.

And then there's Johnny. He is one of the IT people here at Root Candles. But he has really helped us out a lot in *Bee Culture* land. Johnny is our sound guy and computer guy and even puts on a bee costume and dances by the side of the road when we're having our Pollinator Day. So we have kind of claimed him as our own.

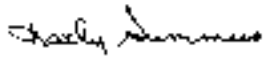
Next year promises to be another busy one for us, but with all of these wonderful team members we're ready.

It's the 150th anniversary of the A.I. Root Company (Root Candles) and we'll be doing our part in the magazine to highlight some of those activities. We're tossing around some ideas for our annual event to tie that in with the celebration.

I am working on *ABC and XYC* right now and the plan is to have it out early Spring of 2019. We have other projects that will be released in conjunction with our celebration – a book by Tammy Horn Potter that has been on hold for a while, about a lady named Jane Cole that worked in our factory when A.I. was alive. The book gives her perspective and A.I.'s perspective during the same time frame. We're also right now redoing the *Autobiography of A.I. Root*, to be released next year.

So there's a lot going on and we're going to try and enjoy the holidays, get a little rest and be ready to charge ahead in January.

I hope you all have the Christmas that you dream of, that you are surrounded by the people you love and that you have some peace and quiet. Enjoy the season!



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Data Sharing Risks And Rewards

For Hobbyist Beekeepers

Joseph **Cazier**
Walter **Haefeker**
Edgar **Hassler**

Introduction

In our September *Bee Culture* article, "*BeeXML Part I: The Power of Big Data and Analytics,"* we discussed how data science can use standardized data to help bees and beekeepers everywhere. In October we followed up with another article titled, *"BeeXML Part II – Achieving the Goal of Standardized Data,"* which focused on the technology for collecting and aggregating the data necessary to achieve the potential benefits that big data has to offer. In this month's article, we focus on privacy and information sharing risks and benefits.

We begin with a discussion on *Privacy Risk Theory* to explain the risks in sharing data, then move to discuss the various types of data sharing, going from keeping one's own records, to sharing summary data, to sharing detailed information with a small group or club, to full data sharing with a non-profit or other trusted, non-governmental third party.

Privacy Risk Theory

In the June 2018 issue of *Bee Culture,* we introduced the concept of the Technology Acceptance Model (TAM) in an article titled, *Nudging Beekeepers Into the Future With the Technology Acceptance Model*[1]. The model posits that there are three main factors influencing a consumer's decision to use consumer software similar to **www.HiveTracks.com**. These are:

- *Ease of Use:* How hard or easy the software is to use
- *Usefulness:* How useful the software is to the user
- *Enjoyment:* How enjoyable the software is to use, sometimes referred to as hedonism

What we did not have time to address in that article, but are returning to now, is an extension to the *Technology Acceptance Model*, which looks specifically at privacy risks and how they can influence the use of software.

A scientific article by Cazier et. al. in 2007[2] framed the issue by breaking privacy risks into two parts and adding them to the other primary constructs in the TAM Model[3]. These parts are:

- *Privacy Risk Likelihood (RL):* This is the probability or likelihood that someone's privacy will be violated.
- *Privacy Risk Harm (RH):* This is the level of damage that could occur in the event of a privacy breach.

It is useful to break the risks into two parts. If a privacy disclosure is very unlikely, but can do great harm if discovered (i.e. finding out a beekeeper is using stolen hives to sell pollination services to almond growers to increase his/her revenue as shown in Figure 1.), a beekeeper might choose one set of behaviors. As the likelihood of the discovery (Risk Likelihood) increases, the (bad) behavior is expected to be reduced.

From Risk Harm we can look at how damaging something can be to someone if it was exposed or acted on in an inappropriate or harmful way. For example, one of the authors of this article loves the TV Series Star Trek. Disclosing this is potentially a privacy breach, but one that has very little risk of harm attached to it. Figure 2. contains an image from the original article (cited above) introducing this concept.

The idea is that by separating out these concepts into how likely they are to occur and how much harm

Figure 1. *Stolen Beehives Recovered and Suspect Arrested*[4].

[1]Cazier, Joseph A., Wilkes, James T. and Hassler, Ed E. (2018) "*Nudging Beekeepers Into the Future With the Technology Acceptance Model*", Bee Culture, June 2018 Issue. Pages 35-40.

Joseph Cazier is the Chief Analytics Officer for HiveTracks.com and the Director of the Center for Analytics Research and Education at Appalachian State University. You can reach him at ***joseph@hivetracks.com***

Walter Haefeker is a professional beekeeper from Upper Bavaria, board member of the German Professional Beekeepers Association, as well as President of the European Professional Beekeepers Association.

Edgar Hassler, Ph.D is the Associate Director for Technology at the Center for Analytics Research and Education at Appalachian State University. You can reach him at ***hassleree@appstate.edu***

[2]Cazier, J. A., Wilson, E. V., & Medlin, B. D. (2007). "The Role of Privacy Risk in IT Acceptance: An Empirical Study". International Journal of Information Security and Privacy, 1(2), 61-73.

[3]Note that this was before the iPhone was launched and enjoyment became a primary component of acceptance, hence the models from that time generally did not include that factor as important as they do today, this why it was not included in that original model focused on privacy risks.

[4]https://abc7.com/news/stolen-beehives-worth-nearly-$1-million-recovered-near-fresno/2004572/

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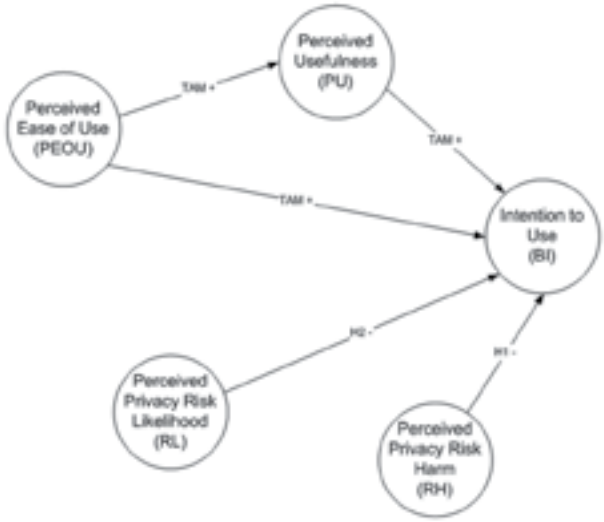

Figure 2. *Privacy Risk Harm and Risk Likelihood Modifying TAM.*

could happen if they were to occur, we can better predict someone's behavior, particularly around the idea of willingness to use an information system to track their bee data. Then, by taking the value or estimate for each component (RL and RH), you can combine them for a total estimate risk score. You can then compare different levels of risk for each dimension and use that information to make better decisions.

For example, if, on a one to 10 scale, the harm that *American Foulbrood* (AFB) is rated near 10 (see Figure 3.), but the likelihood of an infestation is near one or two, you can then combine these numbers for a total risk score of 10 X 2 = 20 out of 100 possible[5]. Numbers and risk scores will vary based on geography, genetics, and a number of other conditions.

However, rather than just saying the risk is high, if we break them into these components, the nebulous risk can be assessed, categorized, and weighted to help us make better management decisions on what actions (or inactions) to prioritize.

This approach also gives us the ability to compare various risk scores. For example, if the RH is a seven for a *Varroa* infestation (perhaps due to treatment options), but its likelihood is a four given its prevalence in a given area, then the total risk score would be a (7 X 4) = 28, ranking it relatively higher than the AFB for those hives. This in turn would influence where rational beekeepers should spend their limited time, attention, and resources in taking care of their bees as they weigh the various threats.

This same concept applies to privacy risks. If the risk of some data being exposed is relatively real (A hobbyist beekeeper forgets to log out of the system on a public computer [such as at the library] and becomes worried that someone will see his/her bee records), but the harm is low (someone might know how much honey the beekeeper produced last year), then the total risk can be calculated as two (someone looks instead of simply logging

[5]Of course these numbers are explaining the concept, real risk scores vary greatly based on a number of factors including geography, genetics, hive history, infestations in a region, migration patterns, time of year etc.

Figure 3. *American Foulbrood and the harm to the operations. Source* ***https://en.wikipedia.org/wiki/Americanfoulbrood***

the beekeeper off) X 1 (someone knows the beekeeper's honey number) = 2/100. At which point the beekeeper might not be overly concerned when realizing he/she forgot to log off the computer.

Please note, however, that when it comes to information sharing, just as there are risks and benefits in sharing information, there are also risks and benefits in not sharing information or in sharing fake or misleading data.

Hobby vs. Commercial Beekeepers

The discussion of privacy mainly applies to hobbyists who perceive sharing data about their hobby as something related to their personal privacy. In this context, the issue is part of a larger civil liberties discussion. For hobbyists, the *Risk Harm* is generally very low, except when they are in a highly regulated environment where society (government) might impose costs or restrictions on them that they do not see as valuable.

On the other end of the spectrum, business and hive data are classic trade secrets for commercial beekeepers because they tend to guard the data, as any privately-held enterprise would, very closely for very good reasons. For commercial beekeepers and large sideliners, the *Risk Harm* is generally much greater than for hobbyist beekeepers.

To give each group proper attention, we will focus on hobby beekeepers in this article and commercial beekeepers in a future article. For the purpose of this discussion, we define a hobbyist as someone who keeps his/her bees mostly for enjoyment and who **does not** earn any meaningful income from their bee operation.

Information Sharing for Hobby Beekeepers

There are several incentives and a couple of discentives for hobbyists to share information and they differ depending on whether the beekeeper is in a heavily regulated environment or a largely unregulated one. Additionally, many beekeepers perceive some regulations as helpful and others as not very well thought out.

For example, in the U.S. there is the recent requirement for beekeepers to consult with a veterinarian before utilizing antibiotics.[6] While some might argue that this regulation is good for society in that it can reduce antibiotic use and slow the development of resistance to it, others have criticized it as ineffective and expensive, and noted that many rural veterinarians are focused on large animals and have limited experience with bees, often relying on the beekeeper for added expertise.

The potential for *Risk Harm*, at least from the beekeeper's perspective, seems to center around who the data is being shared with and in what form. Sharing with a group of friends or a non-profit seems to bear little risk harm or risk likelihood, especially if proper societal and management controls are in place to protect the individual.

However, when it comes to sharing information with the government, many may have a different view. Some may perceive elevated risk harm because they are doing something the government does not want them to do (e.g. avoiding hive taxes in Europe or using off label treatment methods in the U.S.). Other concerns for hobbyists may stem from a lack of trust driven by their perception of the government's motivations or ability to help (or interfere).

Thus, the risk harm seems to stem from these three possibilities:

1. *Reputational Risk:* A loss of reputation among friends, a small group, a private company, or a non-profit organization
2. *Compliance Risk:* Risk of fines or punishment if doing something not permissible by the government (avoiding fees, taxes, registration or using off label treatment) and
3. *Regulatory Risk* - Risk of government interceding in the beekeeping operation in a way that the beekeeper would perceive as unwelcome, unnecessarily, without cause, or for dubious reasons, while also not interceding when needed.

There are many benefits to recording and sharing information about your bees. Let's review some of them by looking at recording and sharing separately.

Keeping Records for Yourself

There are several benefits for hobby beekeepers to record their data. Many of these were discussed in our article in our May 2018 *Bee Culture* article titled, *Electronic Records: A Path to Better Beekeeping.* Here is a summary of a few key ones below.

- *Best Management Practices:* Recording management actions and treatments to avoid redundancy or missing a necessary action.
- *Personalized Hive Management:* Remembering how the colony was doing at a given time to see changes in state or to identify the best queen from which to split a colony and to learn what works with your bees in your area.
- *Business Management:* Understanding revenue and expenses for your operations and other factors to optimize profit and productivity.
- *Research:* Keeping quality and consistent records. A hallmark of good science for generations, good records help us learn valuable information about bees and beekeeping, especially when combined with other data and when available at scale.
- *Documentation:* Keeping records for legal or regulatory concerns for government or other reporting requirements. Other times, we might need good records to settle insurance or legal claims.

The benefits listed above will most directly benefit individual beekeepers in managing their hives in a traditional manner, with some benefits going to society as beekeepers and researchers share general knowledge in the form of best practices. More detailed records of better quality, such as that done in a scientific research study, can yield additional benefits, but they also have to be balanced with the cost of collecting that information and the usefulness of the knowledge gained.

- *Reputational Risk:* The Privacy Risk Harm and Risk Likelihood to this type of data keeping is very low, given that the records are kept and controlled by the individual, especially for hobby beekeepers who keep bees for reasons other than their personal livelihood.
- *Compliance Risk:* The risk of sanctions are low for keeping your own records. It is possible that if there is a problem, the court may subpoena a beekeeper's records and use them as evidence in a case; it is also likely the records could be used to clear them, therefore it may be a wash.
- *Regulatory Risk:* Since the beekeeper is keeping records for his/her own use, the risk is primarily that government entities will make decisions with incomplete or overly generalized information.

Sharing Summary Information

The next level of value comes from sharing information from the records that are collected. For some people this is from sharing information about their experiences or collecting observational data from a wide variety of sources. For others it is the scientific reports that analyze the results of experiments and observations and then share general principles.

In addition to the scientific reports, a good example of this type of information sharing would be the annual survey for colony losses done by the *Bee Informed Partnership* (BIP) as shown in Figure 4. You may also see similar benefits from governments or other groups collecting and sharing summary information.

There are critical benefits to this. This type of summary sharing can inform legislative policies, guide grant funding to address critical issues, and bring attention to the problems beekeepers are facing. It also

[6] https://www.beeculture.com/do-i-need-a-vet-for-my-bees/

Figure 4. *Colony Loss Map from BIP.*

gives us data to see more clearly what things are or can work to help address at least some of the problems.

- *Reputational Risk:* The risk of sharing summary information is low. As information is generally anonymized and aggregated by researchers, the harm of having it shared is low and the likelihood of a breach is mitigated by trust in the researchers.
- *Compliance Risk:* This risk is also low as records are generally anonymized. If sharing with the government, as required in parts of the world, there could be some risk if the data is not anonymized. Both harm and likelihood are minimal.
- *Regulatory Risk:* Here we may be looking at trust in the organization receiving the data. If hobbyists believe in the ability of the organization to use their data to help bees, such as a group like BIP, then they may make the effort to share. Both harm and likelihood appear to be minimal.

Sharing Detailed Information with a Small Group

The next level of data collection begins to move beyond the individual summary information to sharing or pooling detailed information into larger groups. This move is very important as each hive is unique in its history, climate, genetics, disease profile, and bee behaviors. By going beyond simply sharing and analyzing summary information to sharing details and key information, we can move from general knowledge to specific knowledge.

For example, you could pool data to address a common problem in a region that a group of beekeepers face. Because you have larger numbers and are perhaps in a similar environment with similar challenges, pooling your data might help to address a problem by giving you greater statistical power to detect an effect because larger numbers help control for the variation. This can be very helpful to a club, county, or region faced with a geographic, genetic, or environmental problem where additional data could help quickly identify a solution.

Another advantage to sharing detailed information within a group can come in the form of a warning system, similar to those of old set up to monitor and fight an invading army or common enemy. This is generally done through a vector analysis and alert system. For example, a friend of ours, Michael Rubbingg, the Chief Science Office for the Austrian Beekeepers Association, has successfully set up a *Varroa* alert system across Austria. By sharing specific, detailed data among beekeepers in different locations across the country, they can track the movement of varroa and warn beekeepers when the risk is high for them to be infected. This gives beekeepers time to prepare and take preemptive action to prevent or reduce harm.

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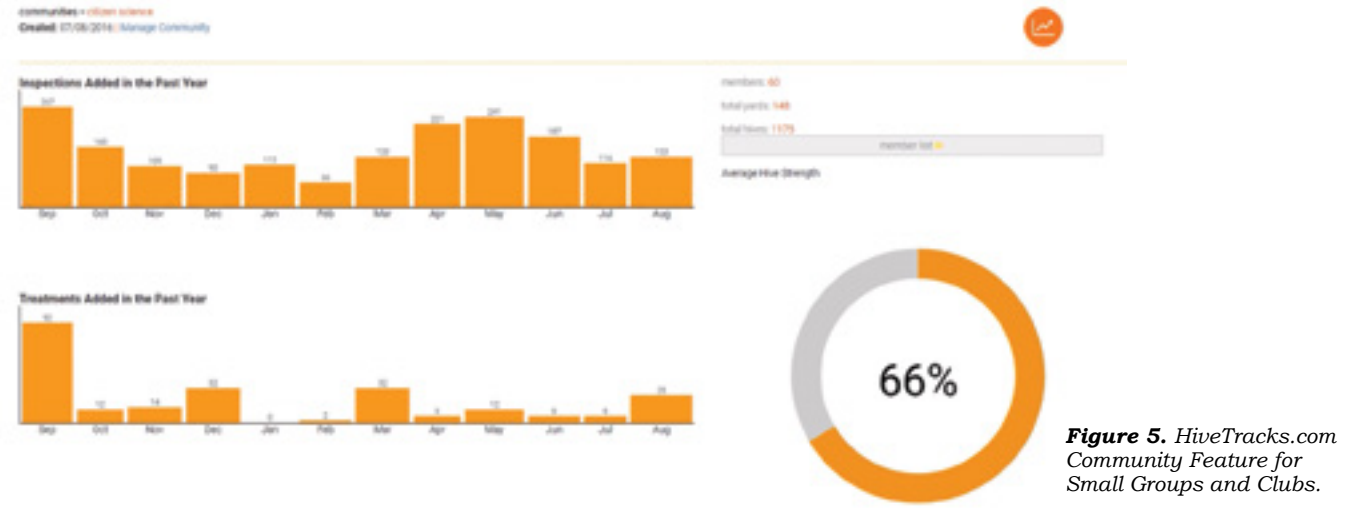

Figure 5. *HiveTracks.com Community Feature for Small Groups and Clubs.*

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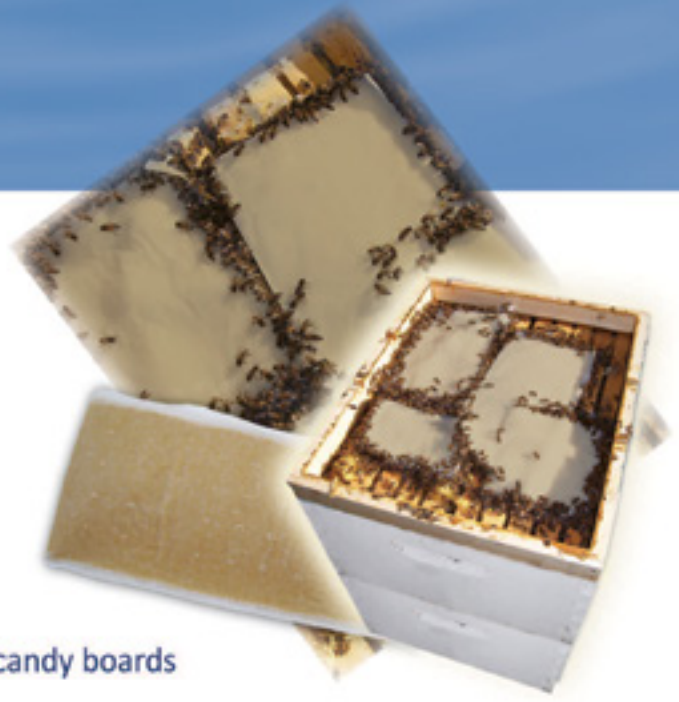

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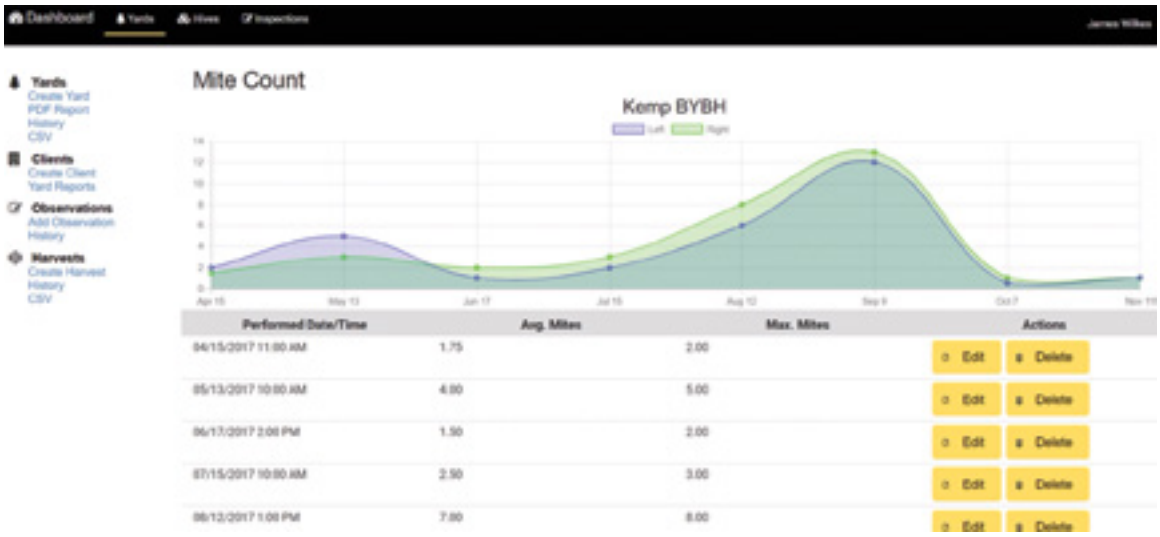

Figure 6. *Mite Load Graphics from* ***HiveTracks.com***

such as HiveTracks, to choose the most pressing issue their members face and collect detailed data on it across the region. Queen breeders could also team up with beekeepers to move beyond selling queens to better tracking how their queens are doing in different geographies with different threats. It could enable queen breeders and their clients to share very detailed information within their group that can give specific (as opposed to general) knowledge of what is best for a client in a given location under given circumstances at a given time. In doing so, queen breeders and beekeepers alike can create and share in the value derived from increased efficiency, effectiveness, and profit.

- *Reputational Risk:* For the hobbyist, sharing this type of information still bares little risk, especially when compared to the potential reward. Perhaps some embarrassment among their peers, or pressure to treat their hives in a different manner if the group thinks it is better for all. However, the risk harm is still low, though the likelihood may increase due to the detail.
- *Compliance Risk:* Unless sharing with the government, the likelihood of sanctions are low. Indeed, one may learn of inadvertent non-compliance or more non-intrusive means of compliance. If shared with government entities however, the harm can be significant.
- *Regulatory Risk:* If there is little trust in the ability or goodwill of the group to help, there is little benefit to sharing data. However, the risk is generally small unless beekeepers believe a group may mandate participation in an activity they do not support.

Building a Global Repository of the Worlds Standardized Bee Data

If we go a step farther, we get to the real sharing of data from multiple vendors and sources into a common data platform where we can apply advanced data analytics and machine learning techniques to build what we have been calling the *Genius Hive.* In last month's article (November 2018) we reviewed some of the benefits of sharing detailed information worldwide. Here are a few benefits from that article by way of review.

- *Hive Placement Optimization*: Determine the best location to place your bees, optimized for proper forage and environmental conditions for bees, honey production, and crops.
- *Status Alerts:* Provide updates on the current state of the hive, such as problems with the queen, pests, or pathogens.
- *Predictive Alerts*: Use predictive analytics to anticipate problems before they start and send alerts.
- *Treatment Optimization*: Use data from thousands of outcomes of similar hives to guide which treatment options would be most likely to succeed for a given hive under given conditions.
- *Trend Analysis*: Monitor regional and national trends in real time for better policy and response to incoming threats.

The risks associated with using such a platform are:

- *Reputational Risk:* Reputational risk is minimal with proper safeguards as the data would go to a distant group who may not know the beekeeper.
- *Compliance Risk:* If the purpose of the group is to learn from the data, the risk likelihood of sanctions in minimal, though the harm might be significant.
- *Regulatory Risk* - If there is a lack of trust in the group doing the collection and analysis, there is little incentive to share data, but also little harm or likelihood. There is also the potential of added complexity of complying with international privacy laws, which may ultimately increase user privacy and security, though perhaps an added burden to the collecting organization.

Since we have covered this at length in other articles, suffice it to say that we believe the benefits of building a common data platform, with appropriate privacy and security controls, is a necessity for the long and short term survival and viability of bees and beekeepers everywhere, especially since these events are additive. Any benefit from the earlier types of sharing can also apply to sharing at this level, but with much more detail and possible benefit.

This type of information sharing offers the greatest potential benefit beekeepers. These benefits apply to both the individual beekeeper who will be able to use the features of a genius hive to make better decisions that ultimately benefit society as a whole as more bees

Figure 7. *Healthy Hives 2020 Logo.*

Figure 8. *Thanks to* ***Hive-Tracks.com*** *for their support of this work.*

survive. Yet the benefits are less concrete than simply keeping your own records, are harder to visualize, and have a greater time delay. For hobbyists, who keep bees because they love them, the risks are still low, especially with privacy protections in place to anonymize and protect their data. This minimizes both the likelihood of a privacy risk and the harm of a potential event, while maximizing the benefits data sharing.

Conclusion

The risk for hobbyists to share data is generally low, but the benefits for them and for beekeepers everywhere is very high. We hope that hobbyist beekeepers will participate in efforts to "save the bees" by becoming citizen scientists and sharing their data with groups that can credibly use the data to help us all.

We do note that there is at least a potentially significant risk when it comes to trust and government actions that warrants further investigation. There is also a very different risk profile for commercial beekeepers with large operations and trade secrets. We plan to write about trust, commercial beekeepers and privacy in the next few articles along with possible technical and policy solutions to address likely concerns.

Finally, special thanks to *Project Apis m.* for supporting a portion of this work with a *Healthy Hives 2020* grant, to leaders at **HiveTracks.com** (Figure 7.) for sharing their thoughts on this topic and to the editors of *Bee Culture* for publishing this work. These efforts would not have been possible without visionary groups like this one providing support and resources.

Please stay tuned next month for our planned follow up on building trust in the government sector to address some of these issues and the following month for a review of emerging technologies that can help address privacy concerns. BC

FOUND IN TRANSLATION

Replacement Queens, A True Cinderella Story

Jay **Evans**, USDA Beltsville Bee Lab

Honey bee colonies and beekeepers alike can't afford to take queen rearing lightly. During supercedure events, swarm preparation, or emergency queen replacement, nurse bees must reach a quick consensus on which female larvae will receive royal care. Two recent articles from leading bee scientists offer contrasting views for how that choice is made. Ramesh Sagili and colleagues suggest that nurse bees make an economic choice, by tending to invest in well-fed young larvae as their future queens. Presumably, young female larvae that are large for their age will develop into more robust queens. Sagili and colleagues starved clusters of first-instar female larvae for four hours by blocking out nurse bees with a mesh screen. They then placed combs containing these clusters, alongside clusters of larvae that had been fed normally, into colonies that were ready to raise a replacement queen. Food-deprived larvae, while still viable, were far less likely to be picked as replacement queens. Interestingly, the discrimination against skinnier larvae was not observed when starved and normal larvae were placed into queen cups, suggesting that the stimulus of these cups outweighed any cues nurses might use to pick the most queen-worthy larvae. As further evidence that nurse bees can smell starvation, or that starving larvae tend to beg more for food (or both), larvae that had been deprived of food were fed more often and for longer periods. Thus, nurse bees did their best to get these larvae caught up in terms of worker development, despite tending to pass them over as future queens. Their work is described in "Honey bees consider larval nutritional status rather than genetic relatedness when selecting larvae for emergency queen rearing", *Scientific Reports* 8:7679, **https://www.nature.com/articles/s41598-018-25976-7**, 2018.

This and other experiments suggest that physical cues and/or chance are the main forces driving which larvae are chosen for the queen route, but this need not be the case. Much thought and work have gone into testing whether there might be a birthright for royalty. This could come in two ways. First, since queen bees mate prolifically, most females in the nest are only half-sisters. If a nurse bee had the power to choose a full sister as the next queen, this nepotistic act would benefit her greatly (especially since the dads of full or 'super'-sisters are haploid and hence give an exact version of themselves to all of their daughters, a tale for another day). As appealing as nepotism seems, it is not a frequent occurrence in bee colonies, arguably because a nepotistic trait would lead to poor queen regulation over time, if not outright battle. There is another way for a genetic bias to present itself. Perhaps there are blue-blooded lineages of honey bees whose members inevitably aim for a royal seat. This, too, can lead to an unstable state, where successful royalty begets more royalty until the ratio of queen-destined larvae gets out of whack, at its extreme leading to dozens of feuding royals and not a lot of stinging or foraging. Still, when this trait is rare there is an opportunity for such royalty genes to hang around.

James Withrow and David Tarpy present strong evidence for 'royalty' lineages in honey bees. Using a form of DNA fingerprinting, they show a tendency for some lineages to be over-represented as queens ("Cryptic 'royal' subfamilies in honey bee (Apis mellifera) colonies" *PLoSONE* 13(7):e0199124, **https://doi.org/10.1371/journal.pone.0199124**, 2018). Chosen royals are extremely rare, and in fact the authors propose that queen bees are even more promiscuous than currently thought, and some of the most rare lineages (patrilines) show this royal bias. So how does this trait arise and why don't royal lineages predominate? Mechanistically, royal-leaning larvae must attract special attention from nurse bees, perhaps like the starved larvae above, but without going through starvation. Since nepotism is not involved, these 'feed-me-well' cues must be perceived by average nurse bees. The authors argue that the other forms of queen replacement, namely supercedure and pre-swarming, slow the rise of royal lines. Here, queen-destined larvae are laid in preformed queen cells and it seems implausible that a queen aspirant could determine her own birth order in such a way as to land in a queen cell.

A true fairy tale skips over the gritty details, but if you are interested in which changes occur *inside* chosen queens when they start on a royal path, numerous scientists have tackled this. One way involves measuring how larvae turn on specific genes that lead to the proteins best suited for royalty or a life of work. Xu-Jiang He and colleagues have provided a complete view of these caste-biased genes in their recent paper, "A comparison of honeybee (*Apis mellifera*) queen, worker and drone larvae by RNA Seq" in *Insect Science*, **https://onlinelibrary.wiley.com/doi/full/10.1111/1744-7917.12557**,

2017). This topic is fascinating to me personally and in fact is the very question that brought me into bees 20+ years ago. Diana Wheeler, Gloria deGrandi-Hoffmann and I recount the ways specific genes can lead to queens or workers in "Honey bee queen production: Tight genes or too much food?" *American Bee Journal*, 140(2), 136-137, 2000). The next time you induce a queen event in your colonies, or watch as one unfolds, remember the many forces inside new queens and their nestmates that can affect the outcome. BC

A Closer LOOK

QUALITY, QUANTITY AND DIVERSITY ARE ALL IMPORTANT

Clarence **Collison**

The observed increase in foraging distances with decreasing landscape diversity suggests that honey bees compensated for lower landscape diversity by increasing their pollen foraging range in order to maintain pollen amount and diversity.

The availability of pollen in agricultural landscapes is essential for the successful growth and reproduction of honey bee colonies. The quantity and diversity of collected pollen can influence the growth and health of honey bee colonies, but little is known about the influence of landscape structure on pollen diet. In a field experiment, Danner et al. (2017) rotated 16 honey bee colonies across 16 agricultural landscapes, used traps to collect samples of collected pollen and observed intra-colonial dance communication to gain information about foraging distances. DNA metabarcoding was applied to analyze mixed pollen samples. Neither the amount of collected pollen nor pollen diversity was related to landscape diversity. However, they found a strong seasonal variation in the amount and diversity of collected pollen in all sites independent of landscape diversity. The observed increase in foraging distances with decreasing landscape diversity suggests that honey bees compensated for lower landscape diversity by increasing their pollen foraging range in order to maintain pollen amount and diversity. Their results underscore the importance of a diverse pollen diet for honey bee colonies. Agri-environmental schemes aiming to support pollinators should focus on possible spatial and temporal gaps in pollen availability and diversity in agricultural landscapes.

Honey bee worker energy reserve levels are correlated with task performance in the colony. Nest workers have abundant stored lipid and protein while foragers are depleted of these reserves; this depletion precedes the shift from nest work to foraging. Toth et al. (2005) tested the hypothesis that lipid depletion has a causal effect on the age at onset of foraging. They found that bees treated with a fatty acid synthesis inhibitor (TOFA) were more likely to forage precociously. The second objective of this study was to determine whether there is a relationship between social interactions, nutritional state and behavioral maturation. Since older bees are known to inhibit the development of young bees into foragers, they asked whether this effect is mediated nutritionally via the passage of food from old to young bees. They found that bees reared in social isolation have low lipid stores, but social inhibition occurs in colonies in the field, whether young bees are starved or fed. These results indicate that although social interactions affect the nutritional status of young bees, social and nutritional factors act independently to influence age at onset of foraging.

Honey bee collecting pollen.

Parasites often modify host foraging behavior, for example, by spurring changes to nutrient intake ratios or triggering self-medication. The gut parasite, *Nosema ceranae*, increases energy needs of the Western honey bee, but little is known about how infection affects foraging behavior. Ferguson et al. (2018) used a combination of experiments and observations of caged and free-flying individual bees and hives to determine how *N. ceranae*

affects honey bee foraging behavior. In an experiment with caged bees, they found that infected bees with access to high-quality pollen were more likely to survive than infected bees with access to lower quality pollen or no pollen. Non-infected bees showed no difference in survival with pollen quality. They then tested free-flying bees in an arena of artificial flowers and found that pollen foraging bees chose pollen commensurate with their infection status; twice as many infected bees selected the higher quality pollen than the lower quality pollen, while healthy bees showed no preference between pollen types. However, healthy and infected bees visited sucrose and pollen flowers in the same proportions. Among hive-level observations, they found no significant correlations between *N. ceranae* infection intensity in the hive and the proportion of bees returning with pollen. Their results indicate that *N. ceranae*-infected bees benefit from increased pollen quality and will selectively forage for higher quality while foraging for pollen, but infection status does not lead to increased pollen foraging at either the individual or hive levels.

Lach et al. (2015) determined the impact of *Nosema apis* on honey bee foraging trips. They individually fed 960 newly eclosed workers either a sucrose solution or 400 *Nosema apis* spores in a sucrose solution and tagged them with a unique radio frequency identification (RFID) tag to monitor their foraging behavior. They found spore-fed bees were less likely to forage than those fed sugar only. Those that did forage started foraging when they were older and stopped foraging when they were younger than bees fed sugar only. However, inoculated and non-inoculated bees did not significantly differ in the number of foraging trips taken per day, the total hours foraged over their lifetime, or homing ability. Inoculated returning foragers were 4.3 times less likely to be carrying available pollen than non-inoculated returning foragers and the number of pollen grains carried was negatively correlated with the number of *N. apis* spores. In an arena of artificial flowers, inoculated bees had a tendency to choose sugar flowers over pollen flowers, compared to non-inoculated bees which visited pollen and sugar flowers equally. These results demonstrate that even a relatively low dose of a widespread disease may adversely affect bees' ability to pollinate flowers.

Honey bee foragers load a small amount of honey into the crop when they leave the hive. This "honey at departure" is used as a material to build pollen loads (glue honey) as well as fuel during flight in pollen foragers. Harano and Sasaki (2015) investigated the relationship between the size of pollen loads that a forager collected and the amount of honey at departure. Dancing pollen foragers increased honey at departure with the size of collected pollen loads. Analysis of the waggle-run duration revealed that the size of pollen load affected the rate of increase of honey at departure with food source distance in dancers. The increase rate was significantly higher in dancers that had returned to the hive with large pollen loads versus nectar-collecting dancers, but not in those with smaller pollen loads. The higher increase rate may reflect additional fuel carried for the return trip in pollen-foraging specialists that do not use collected nectar as fuel. Although honey carried by departing dance followers also increased significantly with the size of pollen load carried by dancers, the adjustment was different from that of dancers. These results suggest that recruited bees adjust the amount of honey at departure, including glue honey, based on communicated information and modify the amount of honey load subsequently based on their own experience.

Honey bee workers consume a variety of pollens to meet the majority of their requirements for protein and lipids. Recent works indicates that honey bees prefer diets that reflect the proper ratio of nutrients necessary for optimal survival and homeostasis. This idea relies on the precept that honey bees evaluate the nutritional composition of the foods provided to them. While this has been shown in bumble bees, the data for honey bees are mixed. Further, there is controversy as to whether foragers can evaluated the nutritional value of pollens, especially if they do not consume it. Corby-Harris et al. (2018) focused on nurse workers, who eat most of the pollen coming into the hive. They tested the hypothesis that nurses prefer diets with higher nutritional value. They first determined the nutritional profile, number of plant taxa (richness), and degree of hypopharyngeal gland growth conferred by three honey bee collected pollens. They then presented nurses with these same three pollens in paired choice assays and measured consumption. To further test whether nutrition influenced preference, they also presented bees with natural pollens supplemented with protein or lipids and liquid diets with protein and lipid ratios equal to the natural pollens. Different pollens conferred different degrees of hypopharyngeal gland growth, but despite these differences, nurse bees did not always prefer the most nutritious pollens. Adding protein and/or lipids to less desirable pollens minimally increased pollen attractiveness, and nurses did not exhibit a strong preference for any of the three liquid diets. They concluded that different pollens provide different nutritional benefits, but that nurses either cannot or do not assess pollen nutritional value. This implies that the nurses may not be able to communicate information about pollen quality to the foragers, who regulate the pollens coming into the hive.

Honey bee colonies have a yearly life cycle that might generate nutritional requirements that differ between times of brood rearing and colony expansion in the Spring and population contraction and preparation for overwintering in the Fall. To test this DeGrandi-Hoffman et al. (2018) analyzed polyfloral mixes of Spring and Fall pollens to determine if the nutrient composition differed with season. Next, they fed both types of seasonal pollens to bees reared in Spring and Fall. They compared the development of brood food glands (i.e. hypopharyngeal glands-HPG), and the expression of genes in the fat body between bees fed pollen from the same (in-season) or different season (out-of-season) when they were reared. Because pathogen challenges often heighten the effects of nutritional stress, they infected a subset of bees with Nosema to determine if bees responded differently to the infection depending on the seasonal pollen they consumed. They found that Spring and Fall pollens were similar in total protein and lipid concentrations, but spring pollens had higher concentrations of amino and fatty acids that support HPG growth and brood production. Bees responded differently when fed in vs. out of season pollen. The HPG of both uninfected and Nosema-infected Spring bees were larger when they were fed

Honey bee drinking water.

Spring (in-season) compared to Fall pollen. Spring bees differentially regulated more than 200 genes when fed in- vs. out-of-season pollen. When infected with Nosema, approximately 400 genes showed different infection-induced expression patterns in spring bees depending on pollen type. In contrast, HPG size in Fall bees was not affected by pollen type, though HPG were smaller in those infected with Nosema. Very few genes were differentially expressed with pollen type in uninfected (four genes) and infected fall bees (five genes). Pollen type did not affect patterns of infection-induced expression in fall bees. Their data suggest that physiological responses to seasonal pollens differ between bees reared in the Spring and Fall with Spring bees being significantly more sensitive to pollen type especially when infected with Nosema. This study provides evidence that seasonal pollens may provide levels of nutrients that align with the activities of honey bees during their yearly colony cycle. The finding are important for the planning and establishment of forage plantings to sustain honey bees, and in the development of seasonal nutritional supplements fed to colonies when pollen is unavailable.

The age at which specific tasks are performed is extremely flexible, as bees are able to accelerate, delay or reverse their pattern of behavioral development (Robinson 1992). The transition to foraging is accompanied by changes in diet (Crailsheim et al. 1992), reduced lipid stores (Toth and Robinson 2005) and reduced blood proteins (Crailsheim 1986) including the lipoprotein vitellogenin (Fluri et al. 1982). The correlation between reduced internal stores and foraging has been observed.

Honey bees are highly social and the workers perform different behavioral tasks in the colony that cause them to be exposed to different local environments. Jones et al. (2018) examined whether the gut microbial community composition of workers is associated with the behavioral task they perform, and therefore also the local environment they are exposed to. They set up five observation hives, in which all workers were matched in age and observed the behavior of marked bees in each colony over four days. The gut bacterial communities of bees seen performing predominantly foraging or predominantly in nest tasks were then characterized and compared based on amplicon sequencing of the 16S rRNA gene. Their results show that some core members of the unique honey bee gut bacterial community are represented in different relative abundances in bees performing different behavioral tasks. The differentially represented bacterial taxa include some thought to be important in carbohydrate metabolism and transport, and also linked to bee health. The results suggest an influence of task-related local environment exposure and diet on the gut microbial community and identify focal core taxa for further functional analyses.

Honey bees obtain micronutrients from floral resources and "dirty", or turbid water. Past research suggests that honey bees drink dirty water to supplement the micronutrients in their floral diet, however, there is no research that directly investigates how floral micronutrient content varies with water preferences, or how micronutrients in honey bees themselves vary seasonally. Bonoan et al. (2018) used chemical analyses (ICP-OES) to investigate seasonal variation of micronutrients in honey bee workers and floral resources in the field. They found that honey bees likely use

mineralized water to supplement their floral diet and may be limited by availability of calcium and potassium. Their results also suggest that honey bees may seasonally seek specific micronutrients, perhaps in preparation for overwintering. BC

References

Bonoan, R.E., L.D. O'Connor and R.T. Starks 2018. *Seasonality of honey bee* (Apis mellifera) *micronutrient supplementation and environmental limitations*. J. Insect Physiol. 107: 23-28.

Corby-Harris, V., L. Snyder, C. Meador and T. Ayotte 2018. *Honey bee* (Apis mellifera) *nurses do not consume pollens based on their nutritional quality*. PLoS ONE 13: e0191050

Crailsheim, K. 1986. *Dependence of protein metabolism on age and season in the honeybee* (Apis mellifica carnica *Pollm*) J. Insect Physiol. 32: 629-634.

Crailsheim, K., L.H.W. Schneider, N. Hrassnigg, G. Buhlmann, U. Brosch, R. Gmeinbauer and B. Schoffmann 1992. *Pollen consumption and utilization in worker honey bees* (Apis mellifera carnica): *dependence on individual age and function*. J. Insect Physiol. 38: 409-419.

Danner, N., A. Keller, S. Härtel and I. Steffan-Dewenter 2017. *Honey bee foraging ecology: season but not landscape diversity shapes the amount and diversity of collected pollen*. PLoS ONE 12(8):e0183716. https://doi.org/10.1371/journal.pone.0183716

DeGrandi-Hoffman, G., S.L. Gage, V. Corby-Harris, M. Carroll, M. Chambers, H. Graham, E.W. DeJong, G. Hidalgo, S. Calle, F. Azzouz-Olden, C. Meador, L. Snyder and N. Ziolkowski 2018. *Connecting the nutrient composition of seasonal pollens with changing nutritional needs of honey bee* (Apis mellifera *L.*) *colonies*. J. Insect Physiol. 109: 114-124.

Ferguson, J.A., T.D. Northfield and L. Lach 2018. *Honey bee* (Apis mellifera) *pollen foraging reflects benefits dependent on individual infection status*. Microb. Ecol. 76: 482-491.

Fluri, P., M. Luscher, H. Wille and L. Gerig 1982. *Changes in the weight of the pharyngeal gland and haemolymph titres of juvenile hormone, protein and vitellogenin in worker honey bees*. J. Insect Physiol. 28: 61-68.

Harano, K. and N. Sasaki 2015. *Adjustment of honey load by honeybee pollen foragers departing from the hive: the effect of pollen load size*. Insect. Soc. 62: 497-505

Jones, J.C., C. Fruciano, J. Marchant, F. Hildebrand, S. Forslund, P. Bork, P. Engel and W.O.H. Hughes 2018. *The gut microbiome is associated with behavioural task in honey bees*. Insect. Soc. 65: 419-429.

Lach, L., M. Kratz and B. Baer 2015. *Parasitized honey bees are less likely to forage and carry less pollen*. J. Invertebr. Path. 130: 64-71.

Robinson, G.E. 1992. *Regulation of division of labor in insect societies*. Annu. Rev. Entomol. 37: 637-665.

Toth, A.L. and G.E. Robinson 2005. *Worker nutrition and division of labour in honeybees*. Anim. Behav. 69: 427-435.

Toth, A.L., S. Kantarovich, A.F. Meisel and G.E. Robinson 2005. *Nutritional status influences socially regulated foraging ontogeny in honey bees*. J. Exp. Biol. 208: 4641-4649.

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Facts About Beeswax

Quality

Wolfgang **Ritter**

The quality of beeswax has become of increasing concern within apiculture. Residues of pesticides and varroacides affect the quality of wax and honey, and also bees' health. Recently, wax adulteration has been blamed for many problems in brood rearing.

Changes in wax

Color changes

Various metals including aluminum, copper, iron and zinc can turn wax brown. Therefore these metals should never be used in wax processing equipment or in water used during wax processing. If wax is heated for too long and at too high temperatures (over 85°C), its color and aroma are changed.

Aromas

Wax easily absorbs foreign odors. If wax is processed on an open fire it will smell of smoke. If it comes into contact with fermented honey its aroma also changes. Stored wax cakes also absorb odors from the environment: for example residues such as biocides (used for warehouse decontamination) can penetrate into the wax.

Residues in wax

Hydrophilic substances (water soluble) including some varroacides (formic, lactic and oxalic acid) and certain pesticides cannot accumulate in wax or only to a minor degree. Amitraz rapidly degrades into its metabolites. They are detectable only in honey and not wax.

Lipophilic substances (fat soluble) are readily absorbed by beeswax, such as the varroacide Coumaphos; and synthetic pyrethroids including Flumethrin and Fluvalinate. Ethereal oils, for example thymol, produce a large amount of residues in wax immediately after application, but residue content will decrease with increased ventilation.

Examination of residues in wax

Since the first identification of *Varroa* in Europe, beeswax is regularly tested for residues. Based on the results, the country of origin of the wax can be determined from the *Varroa* treatments used there. Pesticide residues in wax indicate whether the bees collected nectar from intensive agriculture.

This is a worldwide problem, although beeswax from Africa usually has no varroacide residues, only pesticides: this was determined and published from a study of wax from different regions in Uganda. Residues in wax can be detected only in the laboratory using analytical methods.

Residues in Germany

In 2014 the University of Hohenheim examined comb foundation. Bromopropylate, a varroacide used over 20 years ago, was found and 76% of the samples contained Coumaphos. Both these substances often occur as residues in wax from Germany. The values found are so low that due to the "mobility" of the active ingredients no residues in the honey from these honey combs is expected. DEET (dimethyl-mtoluamide), an agent found in bee repellents was found in 13 wax batches.

In 50 samples analysed by the Bavarian Animal Health Service in 2015, thymol was the most common residue (37%). These high residue levels should be reduced if honey combs are left longer in the hive after treatment, and if both honey combs and comb foundation made from them are well ventilated. In 2017, the Julius Kiihn Institute examined 13 batches for residues and found the presence of 30 different substances. While the residues of the plant protection products were all below 0.1 mg/kg, high values of more than 8 mg/kg were found for the varroacides, thymol and the illegal use of tau-fluvalinate. Only rarely did high levels of the chemicals used to control wax moths (naphthalene, sulphur and the wood preservative parachlorophenol) appear.

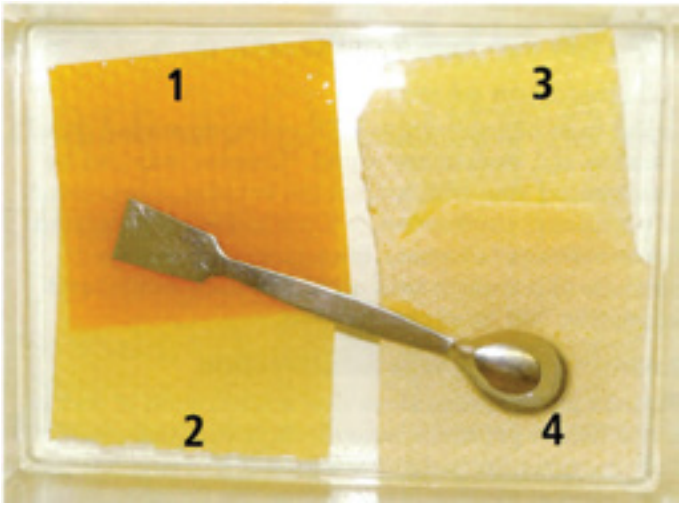
Tolerance by bees

Residues of pesticides and varroacides accrue in wax. These residues are especially concentrated in recycled wax, preventing the absorption of additional substances and possibly transferring into honey. Not only is the honey contaminated, but also the bees' food. Sub-lethal doses in wax show an influence on reared brood and can cause insidious but also acute damage. Therefore, combs from the brood chamber should not be used for the production of foundation. Combs in the honey chamber can be contaminated by pesticides from the environment, especially after honey flow near or in intensive agriculture.

Adulteration of wax

In the case of adulterants with

Foundation made with adulterated or contaminated beeswax causes severe brood damage. On the left is a frame which contained contaminated foundation: many larvae have died, creating a scattered brood appearance. The frame on the right did not have contaminated foundation: here the brood is perfectly fine, showing some capped brood of the same age, and in the centre the brood has hatched completed.



The water bath test is one way to obtain evidence of stearin adulteration from the white precipitate (3 and 4). 1 and 2 do not appear to contain major amounts of stearin. The test will not detect adulteration with paraffin.

synthetic waxes, mostly paraffin and stearin are found. However wax can be adulterated also with animal fat. Paraffin, a byproduct of petroleum production, is a composite of saturated hydrocarbons (alkanes). Stearin is a composite of palmitic and stearic acid obtained from animal and vegetable fats by saponification.

Examination of wax adulteration

Various publications show that adulteration of wax is a worldwide problem, even though analyses started only recently. Since 2017 adulteration of wax has been discussed at various levels within the European Union to find solutions in new regulations.

Sensory examination Freshly produced wax is colorless. Absorption of flavonoids from propolis and/or carotenoids in pollen lead to a bright to dark yellow color. The typical scent of wax is enriched with aromatic substances from honey, pollen and propolis. It is almost impossible to identify adulteration from sensory examination alone.

Physico-chemical examinations

General wax quality can be determined using simple, tests at 20°C. A chalk line is drawn on a wax bar. Cutting along this line the wax should be fine to granular, but not crystalline. When chewing or cutting the wax, it must not be sticky. Cutting along the wax surface should produce spiral-shaped shavings. When kneading the wax it should be elastic but not shiny.

A clear indication of adulteration can be concluded from the melting range (dripping point) of the wax. Heat the wax to 75°C. As it cools measure the temperature every 30 seconds. The collected data can be entered on a datasheet (Excel spreadsheet) to determine the point at which the temperature-time curve deviates from a straight line (upper point) and switches again to a straight line (lower point). For pure beeswax these points are between 61-65°C. If the beeswax is adulterated with, for example 20% paraffin, these points are at a lower range of 58-61°C.

To test for large quantities of stearin adulteration wax plates are laid in a water bath at 37°C for 48 hours. After drying in the open air for one hour, adulterated wax will show a whitish cover: presumably the water dissolves the stearic acid out of the wax, and because it is only slightly soluble in water the stearic acid has sedimented on the wax. Paraffin is not soluble in water and therefore paraffin adulterated wax would show no reaction.

Laboratory examination

An exact determination of wax components and adulteration can be made only in the laboratory. Gas chromatography determines the total carbon coefficient and adulteration is immediately visible from the chromatogram. The fat acid spectrum can be determined also by this method, but it is complex and expensive. Wet chemical methods proving acid, ester and saponification values as well as paraffin and other wax additions are more favorable.

Current inspections of adulterations in Germany

In 2016 the Government Veterinary Institute at Aulendorf examined different suspicious comb foundation samples. The results showed severe adulteration with stearin in wax from China. By July 2017 the Bavarian Animal Health Service had analysed 172 suspicious samples. Paraffin was identified in 32%, stearin in 10% and in 6% both additives were present. Over 100 samples tested to July 2018 showed a similar result. The Ceralyse Institute in Celle examined 13 adulterated batches. In only two samples added paraffin exceeded 1%. However, four samples showed addition of stearin up to 21%.

Tolerance by bees

Foundation adulterated with paraffin displays a lower melting point than pure beeswax foundation. In Summer heat, the foundation can begin to melt. Stearin can make the wax so hard that the brood cannot emerge.

On occasion bees will not adopt foundation made with adulterated wax. A Belgian research group investigated this with admixtures of 15%, 25% and 35% stearin to pure wax. The foundation was accepted by the bees and the queen laid eggs. However, significant numbers of young larvae died in the adulterated combs with survival rate decreasing from 51% to 29% compared with the control (100%). Not all brood damage can be blamed on wax adulteration. Often this is caused by diseases – especially during the second half of the year when a spotty brood pattern or dead brood can be the result of a heavy *Varroa*-Virus-Infection. BC

Dr Wolfgang Ritter runs BEES for the World, which supports African beekeepers to produce top quality beeswax and sell it on the European market promoting African beekeeping, most favorable for bees, beekeepers and the environment. Income from sales supports African beekeeping communities via training provided by Bees for Development. First published in Bees for Development. ***Wolfgang.Ritter@beesfortheworld.de; www.beesfordevelopment.org.***

A Pollination Revolution

Now Is Not The Time For A Head In The Sand Response

Malcolm **Sanford**

Sometime ago, I wrote the following in critique of Jerry Seinfeld's flick, Bee Movie: "One won't learn much about honey bees viewing it. Biologically, It leaves a lot to be desired. For starters, the movie features male bees as workers, when in reality that niche is occupied in nature only by females. Male bees (drones) have nothing to do with pollination, so it is fanciful that they don back packs in the movie to fertilize flowers by spreading pollen around. They also have no role in honey production and thus, when a male bee takes the human race to court for stealing bee honey and exploiting bees, the males again inappropriately take center stage. Finally, the portrayal of a male bee in tennis shoes with only four (not six) legs falling in love with a human female strains credulity.

There's not a lot of research on drones. It's reserved generally for the queen and workers. But that's changing rapidly and not in a way one might think. Actual honey bee males are still pretty much being ignored, but a new era is about to dawn in the form of mechanized, robotic drones.

A hand-wringing post from The Salt, National Public Radio (March 3, 2017), tells the following tale: "Near Esparto, in the beautiful Capay Valley region of central California, 1,400 young almond trees flourish in a century-old orchard overlooking the hills. Since November, they've stood in perfect rows without a hint of foliage – resting, naked and dormant, for the upcoming growing season. Their branches now swell with bright pastel blooms in preparation for pollination.

"Like most almond growers, Brian Paddock, owner of Capay Hills Orchard, relies on bees to provide this important aspect of crop development. 'No bees, no almonds. It's that simple,' he says.

The post continues: "A world without bees may seem far-fetched, but experts are looking for ways to help plants survive without them. Eijiro Miyako, a researcher at Japan's National Institute of Advanced Industrial Science and Technology, has designed what he believes could one day be a partial solution: an insect-sized drone capable of artificial pollination. Coated with a patch of horse hair bristles and an ionic liquid gel, these pint-sized robots can collect and transfer pollen from one plant to another.

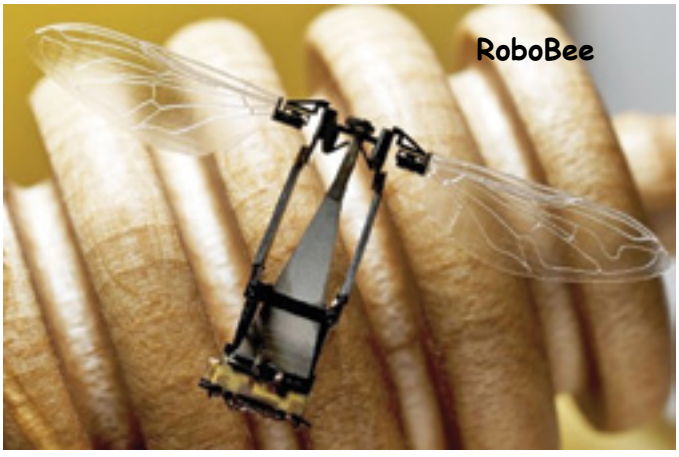
"The project stems from a serendipitous moment. Miyako had previously experimented with using the specialized gel for electrochemical applications. When the gel performed poorly, he tucked the bottles away in a drawer and forgot about them – until he moved out of his lab two years ago. As soon as he rediscovered the gel, he thought about the pollination crisis and honey bee decline

The project referenced above is but one of a number of initiatives that have cropped up to produce drone robots going back as far as 2013. At that time The Smithsonian magazine stated (March 12, 2013): "Plagued by colony collapse disorder, the honey bees that do much of the world's pollination work are in decline, and cheap access to many flowering plants that we depend on for food – from almonds to apples to soybeans – could follow them down.

"Ideally, some intrepid scientist will find a fix for CCD, and the bees will be saved. But there could also be a technological solution to the pollination problem. Researchers have recently worked out the basics of a robotic bee which they say could be used to pollinate plants, search through disaster zones, or perform any variety of tasks where a small swarm of cooperative robots might come in handy.

"Instead of spinning motors and gears, we designed the RoboBee with an anatomy that closely mirrors an airborne insect – flapping wings powered by (in this case) artificial muscles. Our muscle system uses separate 'muscles' for power and control. Relatively large power actuators oscillate the wing-thorax mechanism to power the wing stroke while smaller control actuators fine-tune wing motions to generate torque for control and maneuvering.

"More than just the mechanics of bee movement, however, the scientists also want to train their little Robobees to behave like a real colony – interacting, communicating, working together for the good of the hive. They suggest that they still have a fair bit of work ahead of them, but they expect to see them in the wild in five to 10 years."



With this as a background, it's worth reviewing what "Reverend Billy" wrote for the Huffington Post, August 2014 : "Let's consider for a moment the Honey Bee and its anticipated replacement, the RoboBee. Let's pay a visit to the frankenbee's parents, Monsanto and DARPA. This is but one of several proposals that have

been put forth to develop pollinating drones. Perhaps most dramatic concerns budding cooperation between big agriculture and one of those often inscrutable U.S. military defense outfits, The Defense Advanced Research Projects Area (DARPA)."

According to its wikipedia page, DARPA, "Originally known as the Advanced Research Projects Agency, was created in February 1958 by President Dwight D. Eisenhower in response to the Soviet launching of Sputnik 1 in 1957. Since its inception, the agency's mission is ensuring that the United States avoids further technological surprise. By collaborating with academic, industry, and government partners, DARPA formulates and executes research and development projects to expand the frontiers of technology and science, often beyond immediate U.S. military requirements. DARPA-funded projects have provided significant technologies that influenced many non-military fields, such as computer networking and the basis for the modern Internet, and graphical user interfaces in information technology."

"Reverend Billy" continues, "The RoboBee is a mechanical bee in the design stage at the Micro-Robotics Lab, housed in a well-appointed building at Harvard University. The RoboBee project's Intelligence Office declares that the robotic inventors are inspired by the bee. The RoboBee project's website and press releases use the imagery of the golden bees that we remember from our love of the cuddly, buzzy honey-maker.

"The RoboBee's public relations flacks argue that the military has nothing to do with the RoboBee. However, we have tapes of the lead scientist at the RoboBee's lab, Dr. Rob Wood, publicly thanking DARPA for early financing of the project. He is a 'DARPA Young Fellow,' a million-dollar award given to researchers whose work reflects the 'values of the Department of Defense.' The RoboBee proponents have made a tactical decision to use Harvard University and the National Science Foundation for a veneer of non-drone prestige.

"But there are smoking drones everywhere. Military awards have been pinned to Rob Wood's chest by the Navy and Air Force. This wunderkind of nano-technology has even received a citation from President Barack Obama, drone warfare's most famous fan. The RoboBee is a DARPA project and needs to be a part of Harvard's burgeoning divestment movement.

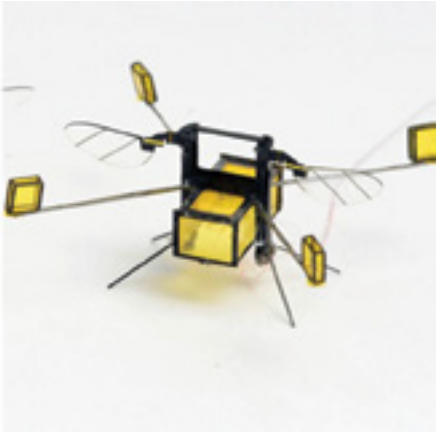
"The RoboBee project's top goal is to achieve mechanical pollination. So Monsanto, Bayer, Syngenta, et al – the Big Ag companies whose agricultural chemicals are driving the honey bee's die-off, must be very interested in this honey bee drone. How couldn't they be waiting in the wings? A robot bee would be invaluable as a pesticide-proof pollinator."

"Reverend Billy" is no fan of this technology it seems, concluding: "The Honey Bee is a lover, a honey-maker, a lyric in erotic songs, an endearment we give each other. The RoboBee, on the other hand, is a drone being financed by the government. This is weaponized nature. The RoboBee is a killer."

According to the Wyss institute at Harvard University, the RoboBee is extrapolated from the very real Harvard, "Micro Air Vehicles Project," inspired by the biology of a bee and the insect's hive behaviors. While the researchers focused on the development of individual autonomous robots, they also plan to study coordinating large numbers of the robots to accomplish tasks faster and more efficiently.

"The robots are created through an incredible micro-engineering process specifically designed for mass production. Each 'Bee' is designed with its own electronic nervous system and power source, and able to target tasks with a microscopic Ultra Violet targeting sensor.

"These micro-engineering advances are increasingly similar to the military's development of miniature drones. Shared knowledge and research in these technologies is resulting in a massive increase of processing power and flight time, as well as the potential for fully autonomous drone swarms."



According to The March Against Monsanto web site (March 22, 2018), Grocery chains are now looking to get into the drone pollination act. "Seeking to compete with Amazon and other major retailers in the world of food production, Wal-Mart has been moving to strengthen their supply chain. The company, worth $220 billion as of 2017, has plenty of expendable income to do just that, and has reportedly invested in patents on a surprising new technology: robotic, autonomous bees designed to pollinate crops. The patents in question call for the use of 'unmanned vehicles,' aka drones, to help with both pollination and crop production. Six patents were applied for in total, with uses ranging from pesticide spraying to plant pollination."

A recent robot called the "dropcopter" is also gathering adherents. According to Digital Trends (June 8, 2018), "With bee populations continuing to decline, farmers, conservationists, and technologists alike are busy searching for a solution to help carry out pollination. A New York-based company recently lent a high-tech hand to assist a local apple orchard pollinate its 300 acres of tasty crops. The Beak & Skiff Apple Orchard in LaFayette called in startup Dropcopter and its pollen-spreading UAVs (unmanned aerial vehicles) to perform the world's first apple orchard pollination by drone.

"Since 2015, we have been pollinating almond orchards with drones," co-founder and CTO Adam Fine is quoted as saying. "We have a patent-pending device which accurately distributes a measured amount of pollen directly over the tree canopy. The drone flies an autonomous prewritten mission optimizing its speed to

deliver the most effective application. We are the first real-world testing of automated aerial pollination in the nation."

Like so much new technology, however, there's a downside as noted by "Reverend Billy" referred to elsewhere in this article. Amid all the buzz, could this plan for "robot bees" have a sting in the tail?

The Daily Mail (August 26, 2018) reports, "One scientist has suggested that RoboBees could be taken over by hackers – and turned into killing machines. At the American Association for the Advancement of Science's annual conference in Austin, Texas, Professor Shashi Shekhar, of the University of Minnesota, warned that security was a key concern for the technology.

"He said: 'Hacking is a security issue so if the bees' own controls are hacked they can be put to a damaging purpose.' And recently told the audience about a chilling episode of the Netflix series Black Mirror in which robot bees are put to 'nefarious purposes'. The storyline involves a rogue hacker who is able to control countless numbers of the drones to attack and kill hundreds of thousands of people.

"Prof Shekhar said: "They send the bees to attack. They use killer bees. With bees all you need is a sting and that sting can deliver a chemical.' The biggest advance in the technology is cameras that can be fitted to other drones. These can then be used to fly over a field and map where all the flowers are to within a few centimetres.

"He concluded: 'If you made a very detailed map, then offline using these images you could create the location of the plants and the flowers. Today these technologies are mature enough that this could be done daily. Then all of this computing and sensing is offloaded from the bee. You can say to bee number-one, 'Go to these 10 flowers'."

Prof Shekhar said robotic bees would be in use within five to 10 years, adding: "Sometimes a crisis allows you to test new technology. If we did have a bee-related crisis that might prompt more early adoption. It's possible this is perceived as a food security issue. There is a food security problem being looked at in the U.S. because of climate change."

Given the above, it's worth considering recent words of Dr. Jerry Bromenshenk, retired professor at the University of Montana, who has famously carved a career out of using technology to help beekeepers manage honey bees. In part DARPA funding assisted him in developing a training protocol for teaching honey bees how to locate landmines, considered the "worst form of pollution on earth."

"We're on the brink of a technology revolution in agriculture – from self-driving combines, to Case and its self-driving and follow-the-lead tractors," he concludes. "Smart phone and tablet apps are popping up for all kinds of agricultural management uses. Drones have gone from costly, large, military surveillance and weapons devices, to common electronic box store sales items with small to medium-sized, cheap to a bit expensive, but yet accessibly priced, drones lining their shelves.

"The automobile was a disruptive technology that displaced horses, buggies, and even buggy whips. Word processors and electronic calculators displaced typewriters, slide rules, and mechanical calculators full of ratchets, cams, and a lever to pull.

"Electric cars, that have been just around the corner for decades (held up by battery technology) are now a reality. The electronics that manage our vehicles from engines and safety technology are spilling over into self-driving vehicles. I like the adaptive cruise control and cross-traffic warnings in my wife's car, but I'm not likely to try off-roading in Montana in a self-driving Jeep.

"Disruptive Technologies drive paradigm shifts. Much as most of us don't like continuous change, it is happening. One can either persist in denial or adapt. The bee industry has never been quick to embrace change. Overall, it lags behind other types of agriculture - there's no yield mapping, self-driving combine, counterpart – yet. If bees and beekeeping are your business, now is not the time for a head-in-the-sand response." BC

HONEY AND CHEESE

Fireworks For Your Mouth

Marina **Marchese**

Move over tea and toast, honey has a new sidekick that will delight your taste buds while engaging your sense of culinary adventure. Have you tried pairing cheese with honey lately?

It's a marriage made in heaven and if you're new to this emerging trend, think of it as a fresh spin on your classic breakfast yogurt and honey. Just imagine the soul-satisfying sweetness of honey drizzled over a creamy, salty cheese, now a bite of crusty bread and say a fig or walnut for that extra tactile pleasure. If this sounds divine and ignites your curiosity, let's explore this mouth-watering duo. As you might expect, there are as many styles and flavors of cheeses to complement every single beekeeper's honey.

The story of cheese and honey began somewhere around A.D. 14-37 with a Roman gourmand named Marcus Gavius Apicius. Throughout the ages, the name Apicius has been associated with luxury and gluttony and just happens to be the title of the oldest collection of recipes from ancient Rome. Although there are many legends surrounding the life of Apicius, history seems to agree that his extravagant menus were regarded as a high art and his parties were lavish banquets often lasting for days on end. After all, feasting was a significant part of Roman society, and honey was a delicacy reserved for only the elite. Apicius included honey in many of his recipes, it kept food fresh and moist; and could mask the taste of spoilage, a grim reality in the days before refrigeration. Featured in one manuscript titled *De Re Coquinaria of Apicius* (On the Subject of Cooking) was a pioneering recipe called Mel et Caseus (Honey and Cheese) This simple, yet elegant pairing called for fresh cottage cheese and coriander sprigs drizzled with honey. Another, Libum, resembles our modern-day cheesecake where Apicius instructs us to mix two pounds of crushed cheese and one pound of flour with an egg to form a soft dough. Bake the dough in a heated oven at 425°F for thirty-five minutes until the cake is golden brown. Warm one-half cup of honey in a bowl then place cakes in to soak for half an hour. Researcher and author, Eva Crane mentions Apicius in her book, *The World History of Beekeeping and Honey Hunting*. She quotes "Honey was used in all sweet dishes, or poured over them after cooking . . ." It appears that Apicius clearly appreciated that the fine flavors of honey are best savored when added as a final touch to dishes, rather than cooked into a recipe.

So how do we begin to choose the best cheese to pair up with honey? It's simply a matter of mixing and matching smells, taste and textures that please you. We can start by accessing the weight or intensity of the honey you have in hand – concentrate on the smell and flavor, is it light and delicate (sage, black locust or fireweed), midrange (linden, clover or orange blossom), pungent or intense (eucalyptus, buckwheat or oilseed rape). The intensity of the honey is a good starting point

to choose the intensity of the cheese for your pairing. I suggest finding a balance where one does not over power the other.

But First, let's brush up on our honey tasting skills. Taste vs Flavor

Taste is one of our basic senses that is defined by sensations the human tongue can experience with food or beverages. The basics are sweet, salty, sour and bitter. Some also include umami, often described as a savory yumminess found in broths, soy sauces, or mushrooms – yes, there are honeys that can be described as having umami, salty, sour or bitter in addition to sweet. Flavors are all those complex notes we experience in our nose while food is in our mouths. Our noses can detect thousands of different flavors and some honeys can be described as having flavor notes of green melon, malt, lilac, gym bag or even dry hay. Understanding taste vs flavor can be somewhat confusing as we are inclined to say something taste good when we are actually talking about flavor. Try eating something with your nose pinched, you cannot taste your food until you unpinch your nose to smell the food. Test your skills for picking out smells and flavors in honey by using the honey aroma and flavor wheel. Begin in the center of the wheel by choosing a general flavor family that your particular honey falls into. Some honeys will fall into two or more flavor families; I consider these complex. Work your way toward the outside of the wheel to hone in on specific flavor notes. The wheel does not provide every flavor you'll taste in a honey however it is a tool to awaken your taste buds and help find the words to express what you are tasting. Always feel free to use your own descriptors that come to mind when describing a honey. I've used descriptors like Grandma's attic, French perfume or wet wool to describe some honeys I've tasted. Each person's tasting experience is unique and personal, we store them in our brains as flavor memories.

Once you have pinned down the flavors in your honey, it's time to pick a cheese. I am excited to share with you what I've learned about cheese from the cheese mongers at Murray's Cheese Shop in Manhattan. For those of you who are not familiar with Murray's, they are regarded as a legend in the world of cheese and everyone who works there is as passionate about cheese as I am about honey. For more than 10 years, I have had the glorious opportunity to work closely with their instructors creating menus for honey and cheese classes at their shop. During our planning sessions, we would taste a wide variety of cheeses and honeys side by side, pick out flavors to procure interesting and educational tasting flights for attendees. Each pairing has featured an interesting combination of colors, aromas, flavors and textural qualities to tickle each taster's tongue. There are no hard and fast rules to creating a magical combination, however, when it comes to pairing these two, it is all about the sensory experience. Like honey, cheese is a *terroir*-driven food meaning the variables in its production impart unique sensory qualities to the final product. Applied to cheese we consider the type of animal's (cow, sheep, goat or buffalo) milk from which the cheese was produced, the pasture that particular animal grazed on including the microclimate, seasonality and cheese maker's touch that make each cheese unique. We can say the same about honey, the floral sources, the environment, climate, soil including the honey bees' preferences will impart ever changing sensory qualities. Both products of nature, can be married in various combinations depending upon your preference for color, aroma, flavor and texture. Check out the cheese counter at your local store and ask to taste a few samples. Taste a variety of cheeses - old, new, stinky and blue. If this is not possible, start with what you know or what you like. Taste and the enjoyment of foods are subjective, so experiment to find a combination that is pleasing to your palate. Engaging all your senses makes your pairings and all food more enjoyable.

Here are a few tips to get you started pairing honey and cheese . . .

Honey Pairing Tip #1 – Complementary

Pairing honeys with cheeses of equal intensity and flavors creates balance.

Light honeys with light cheese and strong honeys with bold cheeses.

Note: sweet honeys will balance out salty, bitter or acidic cheese.

Pairings to try:

Ricotta cheese with light, delicate honeys.

Blue or stinky cheese with bold, dark honeys with animal or woody notes.

Brie or Gouda with wildflower honeys of medium intensity.

Honey Pairing Tip # 2 – Contrasting

Here we try the reverse theory, opposites attract.

Pair light and sweet honeys with salty or blue cheeses or dark rustic honeys with light, mellow cheeses.

Pairings to try:

Cheddar with a bold honey that has warm or vegetal notes.

Parmigiano-Reggiano or Manchego with a sweet and mellow honey with vegetal or woody notes.

Honey Pairing Tip # 3

Texture matters: The texture of our food adds to the overall enjoyment and is an important part of the sensory experience.

Who can resist the chewing on honey in the comb or the fine granules of a whipped or crystallized honey? These two are all about the mouthfeel which adds another dimension to the overall tasting experience. Try equally textural cheeses that are gooey, crumbly or firm.

Pairings to try:

Honey in the comb with a triple crème cheese.

Crystallized honey with a crumbly or firm cheese.

Honey Pairing Tip # 4

Local always works: If it grew together it goes together. Your own honey is naturally a perfect complement to the cheeses and foods that were produced in your region. This is the true meaning of terroir or a taste of a particular place.

Honey Pairing Tip # 5

If you like it, then it is delicious! There's no right or wrong. Start with cheese and honey pairings that you know and like. When in doubt choose a mild, soft cheese like ricotta, yogurt or goat which are light enough to let the honey shine and be the star.

Last thoughts

Honey should complement the cheese so a little goes a long way. Cheese, like honey, is best served at room temperature so remove your cheeses from the fridge 30 minutes before serving.

A variety of flavors and textures keeps it interesting and you may just stumble upon your next cannot – live – without combination. For added textures and flavors serve some roasted or salted nuts like pistachios, walnuts or macadamia. Dried or fresh fruits – anything goes here – so pick your favorites in a range of tart cherries or apricots, fruity dates or raisins or try freshly sliced green apples or figs. Why not include fresh herbs like rosemary or mint to create some drama. Bread or crackers are a necessity as well as wine, beer or mead to wash it down. Choose what you like and experiment often. There are endless choices and combinations so there's something for everyone. Test your choices on your family and friends by serving a platter of various cheese and honey pairings at your next holiday gathering, I guarantee lively conversation and loads of good cheer for all. I regularly post photos of my honey tastings activities on my personal Instagram and Facebook pages @honeysommelier. Tag me to share your honey pairing creations, when possible, I will share and repost. BC

C. Marina Marchese has presented Honey & Cheese classes with Murray's Cheese Shop, EATALY, the Museum of Food and Drink (MOFAD), ICC in NYC, Vermont Cheese Festival, Hazon Food Conference, Crystal Bridges and Slow Food Nations. She is a member of the Italian National Register of Experts in the Sensory Analysis of Honey, where she received her formal training as a honey sensory expert. For more information and honey pairing ideas, check out her book with Kim Flottum, The Honey Connoisseur: Selecting, Tasting, and Pairing Honey, With a Guide to More Than 30 Varietals.

FACEBOOK

Micro Targeting This HUGE Audience

Jessica **Dally**

I promised you in the last article that we'd get down to the nitty-gritty of how to micro-target. But first I want to address this idea of micro-targeting because, if you've been paying any attention, you may be questioning the ethics of participating in such a practice. After all, wasn't Facebook just in front of Congress about this issue?

Well, somewhat. That and a lot of how sophisticated our technology is and how most people don't truly understand the deep complexities of how it works, how we want it to work, data privacy, free speech, harassment and a whole lot more.

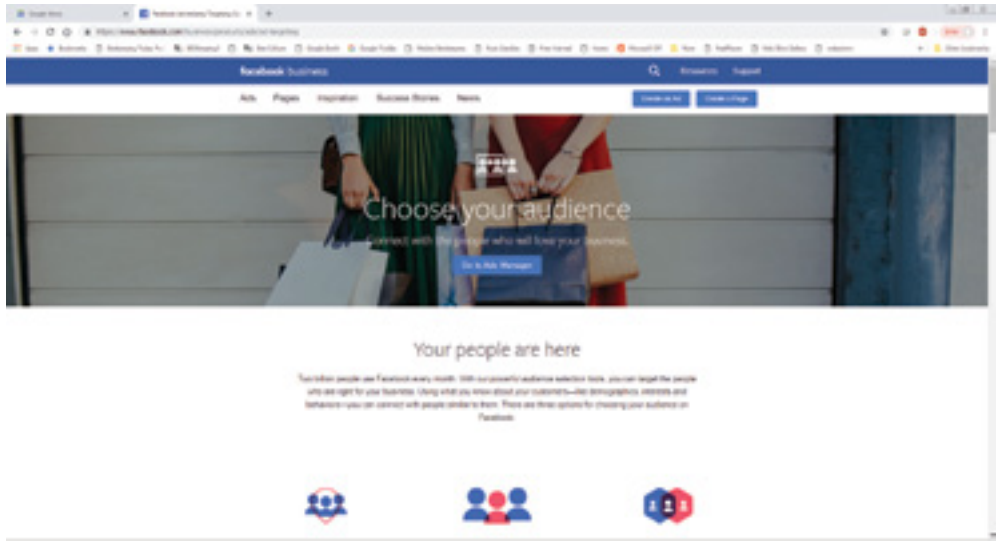
But since we're talking about microtargeting, let's first define what we mean by microtargeting. Back in the day when people advertised they put an ad in the newspaper, on the TV, on a billboard, wherever, and it went out to everyone. A 14-year-old boy in Texas received the same ad as a 34-year-old woman in New York City and an 85-year-old man in Florida. Now it could be that these folks share the exact same love of some product, but my guess is that they probably have different tastes, needs, and wants.

Eventually advertisers realized they were wasting a LOT of money advertising this way. With the invention of complex databases and online advertising, advertisers were able to customize their advertising to fit their specific market segments. And they do. Online ads, television ads, and even magazine ads are tailored as much as possible to the subscriber. Obviously some platforms allow for more customization and some platforms have larger budgets to do this. Your smaller magazine doesn't have the capacity to customize printing for each audience, as an example. They could, but they likely don't have the budget. But share your larger national print magazine with someone from across the country with very different demographic information and you best believe you'll see different advertising.

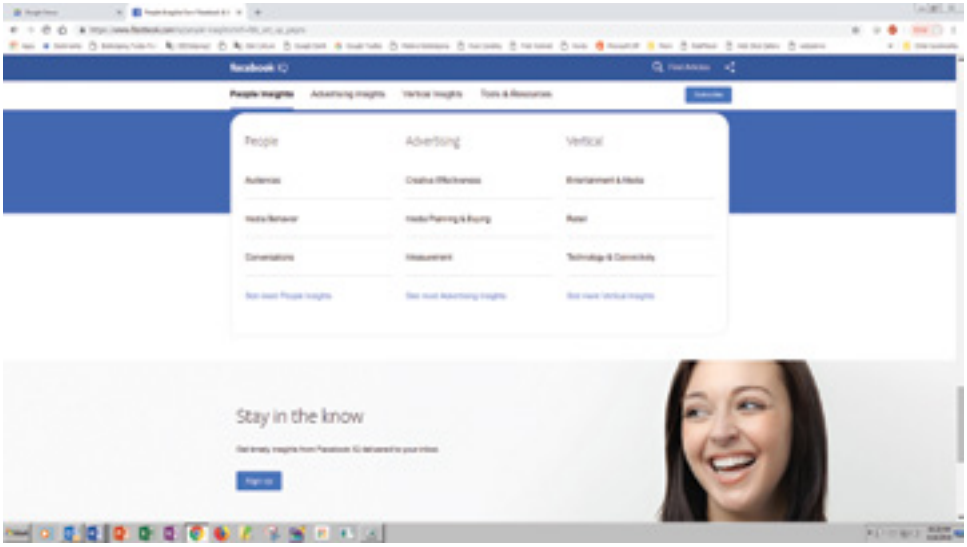
For online companies, this customization of advertising provides a better product, at least, in theory. Instead of getting endless ads for stuff you don't want, you're more likely to get ads for items of some interest. Reducing the amount of spam advertisement helps keep you on as a customer, because no one wants endless garbage shoved in their face – not if there's another platform out there that will show you advertisements you don't find so visually annoying!

So there's the reason behind it. And that brings up a lot of questions regarding ethics. With advanced computer information, you can use this information to influence how people think and even manipulate their responses. No, not significantly. You're unlikely to get someone to do something entirely out of character. But you may be able to push them along a path they may not have taken quite so readily on their own.

But here's the thing. All of that requires a LOT of data, and a LOT more information and analytical skill than most of us have at our disposal.



Our microtargeting is going to take our own capability of analyzing our customers from what we know, not from what advanced computer programming can tell us. And we're not trying to manipulate people to do something they don't want to do here. We're trying to get to people who want your product but don't know you're around, or don't know you're having a great sale, or don't know there's a beekeeping organization in their city. Our desire is to use microtargeting as ethically as possible, to get your ads to people who LOVE you. Not to influence anyone to do something



they don't want to do. In an ideal world, the people who receive your ads would only be the people who screamed "this is exactly what I've been looking for!" when they saw the ad. Don't laugh; this does happen. OK, maybe not the screaming part. But I've seen people share ads with the response that "this is what I've been looking for." So it's your job to figure out how to make that YOUR ad they're sharing.

In the last article, we talked about your picture and wording for it – aka the "creative." In theory, you'll want to create a different creative for each market you want to reach. But to start, think about who your customer might be and create your graphic based on that. I'm going to pick a market and lead you through this based on that idea. So let's make some assumptions about who you are . . .

You're a farmer not far from a major metropolitan area. You sell your honey at the weekend farmer's market and you'd like to make sure you get as many people to that market to buy your honey as possible. The people who show up at that market tend to be pretty well off. They like to shop for local food and they have a higher income. They also tend to care about the environment. They may drive an electric or hybrid car. They are between 35 and 55, they make over 70k a year and they have children. At least many of them fit this description. Now of course this is an assumption. You have a LOT of other people you serve. This is just one group of people you may want to attract. You can make up a bunch of other groups that you serve and put them into different ad campaigns. In the marketing world, these are called personas. Basically, you're just describing one segment of your market.

If you aren't sure, start paying attention to the people you sell to. Look for the differences and the similarities. And a quick tip, if you are sure, question yourself. Look to prove yourself wrong to challenge the assumptions you've made. One of the best ways to do well with microtargeting is to forget everything you THINK you know about your clientele and instead really dig into the truth of who they are with recording precise data.

All of these metrics help you narrow down your ad and who you're going to send it to.

So how do you use these things to target your ad?

First, you'll need to set up your Ads account. There's LOTS of help available online, including instructions from Facebook. A quick google search will lead you through how to do this, so make sure that's in place before you start trying to make an ad.

Ads Manager – www.facebook.com/business-ads

There are two options.

The first is Guided creation- This is where Facebook helps you make your ad. With this option there is MUCH less freedom to customize your ad and truly micro-target. For this reason, I don't prefer it. It's great when you need to get an ad out super quickly. You're running a sale tomorrow and you need to run out the door in 10 minutes. But for this first ad, give yourself some time and Suffer through the complexities of "quick creation." Once you get used to it, you'll see it isn't that difficult.

Quick creation – This is where you get to play with ALL THE THINGS! Here you have real ability to customize all of the parts of your ad.

The first step is to create a campaign. You'll need to choose what you want to do. Roll your mouse over each picture as there are information bubbles on each item to tell you about each one. Here's a look at each one:

Brand awareness- you want as many people as possible to know you exist – people who are likely to be interested in your stuff. This is a good option if you're establishing your shop if you just started selling at a new farmers market if you've never advertised before if you're advertising into a new location. You'll likely not use this one regularly.

Reach – EVERYONE, even if they don't want your stuff. Hardly ever do you do this. Would I ever use it? Yes. Let's say you just opened a shop in your small town. Use this one. Your small town wants to know about new businesses, even if they don't care about what you sell. They may want to see that you employ people. But don't KEEP doing it. It's just a "Hey, we're new to the neighborhood." It's literally like walking around to your neighbors to say hello. If you keep going over to your neighbors to introduce yourself, they're going to get annoyed, and they'll probably think you're a little weird.

Consideration – I'm only going to talk about the common ones most of you are going to use. Most of you probably don't have an app you want people to install. If you do, you probably get what this one is for!

Traffic – Sending more people to a link. Let's say you published a blog post and you want people to read it. This is the one for you. Keep in mind, writing informational articles and sending people to your website can be a GREAT way to grow an audience! Beekeeping clubs and even those selling honey can use this to show that you're someone to be trusted. Become an expert in your field and you'll find people flocking to you for your knowledge AND your products.

Engagement – you just want people to like you more on Facebook. This is a great way to grow your page when you've just started. It's also a

great way to boost up your audience before doing a big sale, promotion, fundraiser (if you're a nonprofit), etc. It's also what you use to get people to engage with your EVENT!!! I use this one a LOT for events.

Video views – you want people to view your video. This one seems like a no-brainer here, but I want to give you the caveat that one option is that people have only seen two seconds of your video. I'd suggest to you that this probably isn't a great way to spend money unless two seconds of your video is AMAZING enough to pull people into the rest of it.

Lead Generation – Honestly, unless you're already doing some really advanced marketing I'd likely stay away from this one for now. Lead Generation is tricky and usually used for people trying to sell classes and other stuff like that. It sounds like a great idea, and you can certainly try it, but people hold their personal info close to them, and it's a much more refined process to do well with this campaign type. If you're doing this kind of marketing, you likely don't need this article.

Messages – I'm guessing most of you don't want this. Unless you have a LOT of folks to answer people private messaging you, this may well create a customer service nightmare for you.

Conversion – Think direct sales here. These are a bit more tricky to set up. Don't start advertising here. Use these ad types when you've become a bit more ad-savvy.

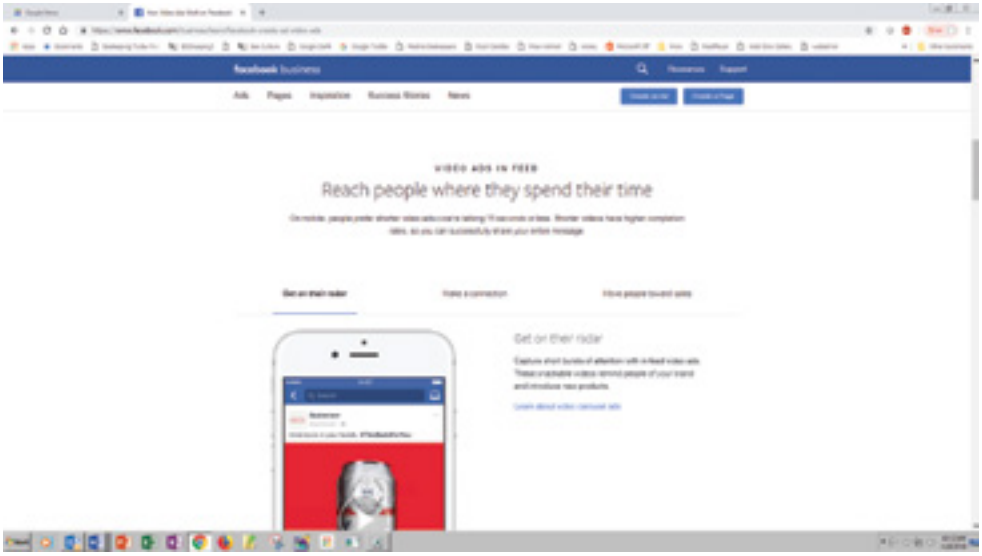
Conversions – this will literally track if people buy stuff from your website from your ad on Facebook. It's going to require some advanced setup.

Catalog sales – ads are created from your catalog based on the audience. Again, awesome in theory, but tricky to set up. Give this a go once you've mastered the consideration ads.

Store Visits – this requires you to set up your business location in business manager. Again, it can be tricky. Don't start here!

Once you've identified your campaign type, you go on to name the campaign and your ad.

For your first time, you'll create a new audience. In the future, you can use saved audiences. Make sure you name your audience in a way that makes sense. Maybe even take notes somewhere recording each



choice you made with each audience name so you can reuse them, IF you want to. Sidenote: I almost NEVER reuse audiences because I tend to have slightly different needs for each item I sold. BUT your audience may not vary that much. You know your product much better than I do. And you can always look through your saved audience to see what is included so it's not the end of the world if you can't recall what an audience includes.

Here you can advertise to people who already like your stuff, or you can reach people who don't know you. This is one of the big places where you really have different ads and different audiences.

As an example, if I'm advertising an event I would have two very different ads. The first would be for people who have shown interest in the event. This ad would merely be reminding them about the event. The second ad would be for people who don't know about the event, and maybe don't know about my shop (or organization). This ad would be quite a bit different as it would have to explain a bit more about the event, who is hosting the event, what goes on, etc. Presenting the same ad to both groups is easier, but it's also a waste of money. Why? You can't customize your ad to truly get the correct message across to each group. And you can't spend the way you might want to.

If your followers are really passionate, or they respond well to other communication (like email) reminding them via a Facebook ad may be something you do with a small budget. You may want to put a lot more on gathering new people to your event. If, however, your event is almost full with people you already know, you may simply want to make sure they all show up. Your spend on new people may be more about making them aware that you have fantastic events and they should be a part of the things you do in the future. By breaking these groups into two, you can customize what you spend based on your goals and based on the specific situation at hand.

As someone who has done a LOT of this, I can't tell you what that will look like. EVERY situation is different. Sometimes my event is full and I just need to remind people. Sometimes I want to see how many new people I can get in the door. Sometimes I don't want to advertise to people who follow my page AT ALL. Sometimes I only want to advertise to them. Each event, each ad, each sale is different. If I'm entirely honest, I don't know that I used an audience twice for many of the small business ads I've run. Bigger businesses do this all the time as they have a budget to run a LOT more ads and their audiences don't change as much, nor do their needs. For smaller businesses, each thing you do tends to be just a little bit different than before. And that can mean changing your audience just a bit.

Your audience choices are broken down by a number of metrics. Remember, you can choose to include or EXCLUDE by these metrics. For example, you could select your state but exclude a specific city if you didn't want to have this ad go there because

you're running a different ad for that location.

Age 13-65. After 65 it's just 65+. It will be interesting to see if Facebook ever changes this to allow you to customize to people over 65.

Gender All, Men, Women are your choices here. It's unlikely you'll want to choose anything other than ALL for this, though obviously if you're selling ladies clothes, or men's shoes, you'd want to be able to pick one of these. Be careful here . . . many times partners are drivers of purchasing!

Languages. I rarely choose anything here. Remember that a lot of people try to game facebook by putting in incorrect demographic information. Also, just because someone has stated that they speak one language doesn't mean they don't speak many. The only time I'd use this is if my ad were in a language other than English.

Detailed Targeting – THIS is where things get interesting. Click on Browse to see all the ways you can customize your audience. For that city dweller farmer's market shopper, we might choose an education level, an income, that they're parents, that they like local food, slow food, etc. Spend some time looking at all the different information you can see here. It may inspire you to create separate ad groups. For example there's a "Young and Hip" group. Hipsters are said to love authentic products that come from local artisans. Hmmm . . . sound like anyone you might know?

Connections – if they're connected to your page or not, either directly or through a friend. Be careful here, a friend of someone connected to your page doesn't necessarily mean they're interested in your stuff. Most of us have a LOT of friends who couldn't care less about all of our different interests. You can try this audience, but don't count on it being a great one.

How custom? So how many metrics should you put in? Well, As I suggested before, you're going to want to spend about $10-$20 for a week of advertising. No, I'm not kidding.

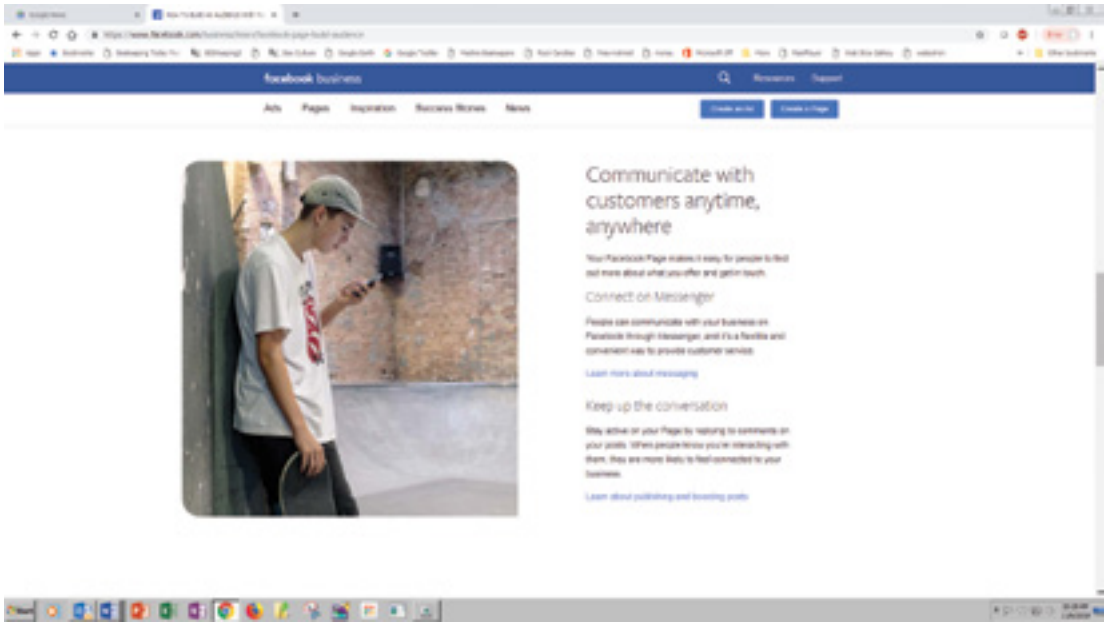
I just did an ad for a local event I run. I targeted many different groups, which added to the total number of people I could find. The location was pretty small, as it's a local gathering after work and traffic in my area is HORRIBLE, so it's doubtful people are going to come from too far away. My budget is $10 for three days because this is coming out of my pocket for this volunteer-run event. While my potential reach is 75k people, that's ALL of the people in this area that meet my requirements, including people who aren't really ever on facebook. My estimated daily results are between 280 and 730 people. My event is at capacity if there are about 100 people at this point. It's outdoors but too many more than this too quickly and we'll struggle. If I were to get 20 more people from this ad it would be MORE than enough.

As your ads run, take a look at the *analytics*. They can tell you a LOT. Do people hate your ads? Are they only responding on the weekends, or just at certain times of the day? Don't run your ads for more than a week. If you want, turn them off for a week, and then back on a week later. Compare one picture with another picture using the same wording. You're playing with very little cash so you can use this to learn a lot about your fans.

I've had great success with very tiny spends. I've sold 30k worth of merchandise with one $10 ad. I've had 100 people at an event with a $20 spend – and it was an event where we expected no one. Literally. Eventually, we started spending a lot more on ads on Facebook simply because we had such great success.

But the first few times don't expect too much. Change up what you do and you'll get better. But keep in mind, you're spending $10 here. If you do that four times a month, you'll be out $40. In the scheme of things that isn't much. And depending on the size of your business that may be more advertising than you should do.

This stuff can and SHOULD be really fun folks, I promise. When you start seeing results it's pretty exciting. And even when you don't, you can learn SO much about your customers from this stuff. It may also impact other areas of your business. The businesses I've worked with made significant changes in how they operate based on feedback from these ads and other online metrics. And they saw considerable improvements in customer happiness and sales. If you can do that with a $10 spend here and there, it's worth it! BC



Hives With The Devil In Them

Stephen **Bishop**

My office neighbors the sale barn. So much so, I once had a staring contest through my window with an escaped goat. During hour lunch breaks in days past, I would occasionally lace up sneakers and go for a run by the barn. As trucks with cattle trailers rumbled to and fro, the sound of the auctioneer jabbering over the loudspeaker distracted from combusting lungs and seizing hamstrings. On non-sale days, the route could still entertain. One or two guys worked on these days, and without the commotion of hundreds of trucks, trailers, and bawling cows, voices echoed from inside the barn, no loudspeaker needed. Once on a run, I heard a worker exclaim, "That bull's got the devil in 'em!"

What a great phrase! I can commiserate with the poor fella working that bull. Any beekeeper who has kept bees long enough has had to deal with a hive with the devil in 'em, from which hellish brood emerge to haunt the beeyard and possess beekeepers into doing self-harm. My worst hive was so hate-filled that my doctor encouraged me to create a concussion protocol. Now if I swat myself in the head 10 times or more, I must go get in the truck and count backwards from 100, then blow the horn, press the brakes, use my left and right turn signal, and switch my headlights on bright. If I can perform all those tasks, I pass the concussion protocol and allow myself to veil up and go back into the game, plus I know I can pass a car inspection.

Hot hives have a way of making people reevaluate things. During a hive's reign of terror and while under siege in a truck, some beekeepers have even been known to experience an existential, concussion crisis:

"Why am I doing this to myself?"

"Why are these bees so mean?"

"Why does the sting in my armpit still hurt so bad?"

"Why does God allow these evil bees to exist?"

"But without evil bees, could we know good bees?

"Why are they still head-bunting the windshield?"

"What is the meaning of life?"

In some cases, it is not so much a hot hive, but a singular possessed bee that seems to terrorize. It's as if this lone bee is holding a grudge – maybe I accidentally smashed her best friend – because it wants to maul you at first sight, day after day, while all her compadres mind their merry business. Who knows? It is probably not the same, singular bee day after day, but a conspiracy of bees taking turns masquerading as the lone aggressor.

In some parts of the world, ill-tempered bees are the new normal. For those of us still outside the occupied territory of Africanized bees, we should probably count our blessings and rejoice that hot hives are exceptions to the rule. Although truly hot hives have been a rarity around here, the few I have experienced have introduced varying degrees of misery to the beeyard. In each case, they have been strong and productive colonies to which I initially wanted to extend the benefit of the doubt: maybe they're just having a bad day. If given the chance, sometimes hot hives do seem to settle down for reasons beyond my understanding. Maybe the instigating bee lived out her final days. Other times they don't. Eventually days turn to weeks and months. Then it gets to where 1) this is not safe 2) this is not fun and 3) I'm so livid at these bees that vengeance will be mine. At this point, the only solution is to put on gauntlets and battle armor and wield the hive tool against the evil queen.

Just be sure the armor doesn't have holes in it. And if a hole exists in the left shoulder of the bee jacket, make certain the duct tape patch is fresh with plenty of adhesiveness. A flapping duct tape patch is the bee equivalent of a flashing neon sign that indicates a place is open for business. Also, make certain your gloves haven't been sitting around so long they've developed the pliability of a catcher's mitt, or else you're liable to drop a frame. And if you do drop a frame and the bees pounce on the hole in the left shoulder of the jacket and navigate the neck and successfully crawl past the defenses of the beard, don't retreat and run away because the bees are trapped running with you. But if you do run away, don't run to your wife's grandpa, Lowry, and tell him to smash the bee buzzing in your veil because the heel of his palm will hit you square in the forehead as if you're the one with the devil in you.

Now this has probably never happened to anyone and likely never will. But if it does, you would, of course, be back in concussion protocol, questioning the meaning of life. All I know is this: truly hot hives make me truly grateful for those booming hives that are as gentle as drones. BC

Night Time Light

Genevieve **Pugesek**

It turns out, daytime pollinators can't make up for lost night time pollinators.

I haven't been sleeping that well since moving into my new apartment. My bedroom window faces a streetlamp, and the light keeps me up at night. I'm sure I'm not the only one with this problem, as nighttime lights disrupt our biological clocks. Humans are not the only animals whose behavior and nocturnal rhythms are disturbed by light pollution from cities: city lights can also impact nocturnal pollinators, like moths. This may not come as a surprise: nocturnal moths are famous for their attraction to bright lights. But while this attraction isn't always fatal, it can harm moths, as well as the plants they pollinate.

Many species of pollinators have declined in recent years, and nocturnal moths are no exception. In the United Kingdom, there are far fewer moths left to visit flowers. In some regions of Great Britain, large moths have declined as much as 40 percent. Across Great Britain, at least 62 species of moths have gone extinct during the 20th century. Unfortunately, identifying the causes of moth declines is a lot more complicated than you might expect. Because cities are often the places that are well lit, it's difficult to determine whether or not moth declines in cities are due to habitat loss or light pollution.

There are many ways moths could be affected by light pollution. For every moment a moth spends under a streetlight, a moment spent finding food or mating is lost. Female moths exposed to artificial light produce fewer reproductive pheromones, and moths are more vulnerable to predators beneath city lights. But while we know city lights are bad for moths, are they bad enough to cause moth populations to decline?

For some species of moths, less light is better, according to recent research published by John Wilson and his colleagues at the UK and Ireland Garden Moth Scheme. The researchers determined the impacts of city light on the 100 most common and widespread species of moths found in light traps across the United Kingdom and Ireland. To isolate the effect of light on moths, the researchers excluded all urban areas from the analysis, and compared counts of moths from sites surrounded by more natural areas. Using satellite imagery, Wilson determined the level of light intensity of the surrounding landscape at every site where a light trap was located. Citizen scientists visited light traps on a weekly basis; each Friday night, volunteers would check traps for moth species that are easy to identify, and count the number of moths of each species. Of these 100 species, 69 were more abundant at sites with lower levels of nighttime light.

If nighttime light is bad for moths, then it's also bad for flowers. Fewer moths means fewer opportunities to be pollinated. While bees and butterflies are some of the more well-known pollinators, nocturnal moths pollinate at least 289 different species of flowers, including several economically important species, like oil palm and tobacco. Unfortunately, plants pollinated by moths are impacted by light pollution in more ways than one.

According to a study published by Callum MacGregor and his colleagues, moths remaining in well-lit areas can be distracted from pollinating flowers by streetlights. The researchers took advantage of a natural experiment by comparing the number of nocturnal moths found in fields lit by streetlights and in unlit fields in the countryside surrounding Oxfordshire, United Kingdom. In lit fields, 1.7 times more moths were found fluttering overhead, near the street lights. But in these lit fields, fewer moths were seen flying at ground level, where the majority of flowers are blooming. By spending more time at lights, moths were spending less time near the flowers.

It's not all bad news. MacGregor found that moths collected at lit sites were carrying pollen, indicating that they were still visiting flowers sometime during the night. At lit and unlit sites, the researchers collected moths as they walked around fields, and from light traps, illuminated sheets which moths land upon after dark. By collecting pollen from the bodies of these moths, the researchers could determine what kinds of flowers each insect had visited earlier in the evening. There was no difference in the types of flowers visited, or the amount of pollen each moth was carrying. But collections of pollen aren't a perfect measure of flower visitation, because

the moths could have collected pollen in the dark before flying over to streetlights. To understand how street lights affect plants, you would need to watch the flowers.

Eva Knop and her research team at the University of Bern did exactly that, finding that nocturnal moths are not as keen to visit flowers under street lights. By setting up mobile streetlights in otherwise undisturbed meadows, Knope was able to isolate the effects of streetlight on the flowers. At night, the researchers counted the number of visits flowers received from pollinators. Flowers lit by a streetlights were 62% less likely to be visited by nocturnal moths.

For plants left under streetlights, fewer visits from moths means fewer opportunities to be pollinated. But does it mean the plant will produce fewer fruits? While moths are responsible for pollinating flowers at night, they aren't the only pollinators around. Some species of plants are pollinated exclusively by moths, but many species can be pollinated by many different insects. City lights might not that problematic for the plants, if the pollinators on the day shift can make up for the labor lost at night.

It turns out that the labor of nighttime pollinators is not easy to replace. Knope found that daytime pollinators can't make up for the loss of pollination services during the night. The researchers tested the effects of street lights on the number of fruits produced by one species of plant, the Siberian thistle. The flowers of this plant are open 24 hours a day, and are visited by both daytime and nighttime pollinators. The thistles illuminated under streetlights did not produce as many fruits as the plants left in the dark; the daytime pollinators weren't picking up the slack from the missing moths.

For plants and pollinators, this is bad news. Across the world, the night is only getting brighter. Satellite images show that from 2012 to 2016, the area of the world lit at night has increased by 2% every year. In developed countries, like the United States, light-emitting diode (LED) lights have become increasingly popular as an environmentally friendly light source. But the blue light produced by LEDs is even worse for wildlife than lights with warmer colors. And because these lights are so cheap to run, people are more inclined to leave the lights on.

There are a lot of things I can do to prevent nighttime lights from bothering me. I can turn down the blue light on my phone or laptop before bed. I can buy blackout curtains for my bedroom window, to prevent the streetlight from shining in. But we have to be careful with what we choose to illuminate at night. Because for nocturnal wildlife, there are no blackout curtains. BC

Citations

Macgregor, C. J., Evans, D. M., Fox, R. & Pocock, M. J. O. *The dark side of street lighting: impacts on moths and evidence for the disruption of nocturnal pollen transport.* Glob. Change Biol. 23, 697–707 (2017).

Knop, E., Zoller, L., Ryser, R., Gerpe, C., Horler, M. & Fontaine, C. *Artificial light as a new threat to pollination.* Nature. 584, 206-209 (2017).

Fawcett Wilson, J., Baker, D., Cheney, J., Cook, M., Ellis, M., Freestone, R., Gardern, D., Geen, G., Hemming, R., Hodgers, D., Howarth, S. Jupp, A., Lowe, N., Orridge, S., Shaw, M., Smith, B., Turner, A., & Young, H. *A role for artificial night-time lighting in long-term changes in populations of 100 widespread macro-moths in UK and Ireland: a citizen-science study.* J. Insect Conserv. 22, 1-8 (2018)

BUILD A BEE WHIRLIGIG

Ed **Simon**

It's time for some frivolity. You have worked hard, become frustrated and then recovered. Now let's build something just for the fun of it. Whirligigs are the lawn ornaments that move or react to the wind.

A whirligig can also be an attention getter for the fairs or flea markets where you are selling your honey and can also be sold to gardeners as lawn ornaments.

This bee shaped whirligig is easy to build and will delight oldsters and youngsters alike. It is not meant to be an exact replica of a bee, but a stylized version. However, no one would have difficulty recognizing it as a bee.

Parts

1. ¾" x 6" x 12" Lumber - Bee body (1)
2. ⅝" x 4" Dowel – Wing support (1)
3. ⅛" x ??x?? – Wing (4)
4. ¾" x ¾" x 3" – Wing hub (2)
5. ¼" Copper tubing – Wing hub bearing (2)
6. ¼" Copper tubing – Rotational pivot bearing (1)
7. ¾" x 6' x 6' - Stand base (1)
8. ¾" Dowel – Whirligig support (1)
9. #8 – 1¾" Screw (2)
10. Washers
11. ¾" x 6" x 6" Lumber – Stand base (1)
12. 1" x ??" Dowel - Standoff (1)
13. Long finishing nail (1)

Construction

The bee body will be made followed by the wings and then an indoor stand to display the whirligig.

Step 1: Cut out the bee body (part 1)

Using the attached drawing, sketch the drawing on a sheet of paper. The lines on the drawing are at 1" increments. You can make a larger or smaller bee just by changing the spacing of the gridlines.

Hint: If you have a computer handy you can scan the attached drawing into the computer and then use an image editor to expand it to the size you need. Print it and use this printed output as the pattern.

Step 2: Cut out the bee body

When you are happy with your drawing, cut it out and trace the bee body on to a board. Cut sand and shape the body to your satisfaction.

Step 3: Drill a ⅝" hole for the wing support.

Hint: Only drill through the bee body until the centering point of the drill bit shows. Then turn the bee body over and complete the hole from the opposite side using the centering point hole as a guide.

Note: Be careful to drill the hole perpendicular to the hive body

Step 4: Make the wing support (part 2)

Cut part 2 from the ⅝" dowel. Then drill a pilot hole in the center of each end of the part 2. These pilot holes will be used for screw alignment and mounting the wings onto the wing support.

Step 5: Install the wing support (part 2)

Glue the wing support in the hole drilled in step #3. Be sure the support is centered in the bee body and the amount of support on each side of the body is equal.

Step 6: Make the wings (parts 3)

Using the same technique, you used for step 1 to draw the bee body, draw the four wings on to ⅛" thick wood. You can design your own wings. A couple design restrictions need to be adhered to. First the wing width must not be wide enough as to hit the bee body. At the same time, it must be large enough to catch the wind. Cut the four identical wings out and sand them.

Hint: An easily obtainable source of free thin wood is a paint stirrer. Most home improvement stores will give them to you.

Hint: Align and clamp all the wings together and then sand them to shape as a single unit.

Recovery: If your design of the wing does not work, you can try again. The wings are separate and removable pieces until you finally glue them in place.

Step 7: Make the wing hubs (parts 4)

This is the most challenging part of making the whirligig. Cut a ¾" x ¾" x 3" piece of lumber. Make sure the grain runs the long way in the block of wood. Using the opposite corners as guides, cut a 1" deep slot in the end of the hub. The cut must be wide enough to allow a wing (part 3) to slide in and at the same time be tight enough to hold it in place. Continually test fit the wings to ensure a snug fit.

This is important: Now at the opposite end of the hub, perform the same cut. **But, But, But,** connect the corners that were not connected in the first cut. This will position the wings 90 degrees in relation to each other.

Repeat this step for the second set of wings.

Step 8: Add the wing hub bearings (part 5) to the wing hubs

Drill a 15/64" hole in the center of the wing hub.

Using ⅞" pieces of ¼" copper tubing (part 5), force it through the hole you just drilled. The extra 1/8" section of the tube will be positioned toward the bee body and keep the wing hub from rubbing against the wing support.

Step 9: Assemble the wing unit

Fit the wings into the slots in the wing hub. Do not glue the wings on to the hub at this time. You may find that you have to redesign your wings so they will spin freely on the assembled bee.

Hint: You may have to use paper shims to hold the wings in place so they can be tested.

Step 10: Test assemble the bee

Using the screws as axels and washers as bearings, add the assembled wings to the wing support. The wings should be able to rotate easily and not touch the bee's body. The copper tubing that extends from the wing hub and a washer minimize friction and wear.

Hint: You can use a hair drier as a wind source to see if the wing design provides enough surface area to spin the unit.

Step 11: Finish the wings

Once you are satisfied the wings will spin freely, remove the wing assemblies from the bee and glue the wings (parts 3) into the wing hubs (parts 4). Align them carefully so they are straight. To ensure they are solidly attached you should put some small brads through the wing hubs into the wings.

Step 12: Reassemble the bee

Put the wings back on the bee. This is so the rotational pivot alignment in the following step will have the correct weight distribution.

Step 13: Locate the rotational pivot (part 6)

The bee's attitude is influenced by the positioning of the rotational pivot hole. The bee can either be flying up, down or level depending on the position of the pivot.

1) Tack a small brad into the top of the bee's body.
2) Hang the bee from this brad. The bee will tilt using the brad as a pivot point. Move the brad along the top of the bee until the bee assumes the attitude you want.
3) Draw a vertical line from the brad to the bottom of the bee

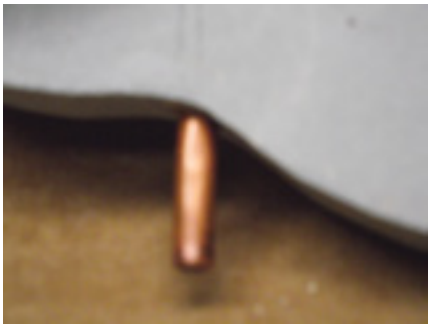
This is the alignment needed to keep the bee facing into the wind with the correct attitude.

4) Drill a 15/64" hole in the bottom of the bee aligning it with the mark you made showing the center of gravity. Make the depth of this hole a deep as you reasonably can.

Note: The bee will rotate around this hole. The larger cross section of the bee is used to keep the whirligig pointed into the wind.

Step 14: Add the rotational bearing (part 6)

Cut a section of ¼" copper tubing and force it into the hole. The length of this tube needs to be longer than the depth of the hole and it must extend far enough below the bee, so the bee can rotate without hitting anything. It does not have to go all the way into the hole. This Tubing acts as a bearing and reduces the wear, tear and friction



on the assembly when the whirligig rotates.

Note: The tubing can be shortened after the bee's final assembly and the bee is tested on the stand.

Whirligig Stand

The stand is a separate item that is not needed for the bee to work correctly. It also eases the painting and testing of the bee. The stand can be used to display the bee indoors. It can even be attached to a railing outdoors.

Note: I attached the stand base to a patio railing with electrical cable ties which worked great.

Note: The dimensions listed are only suggestions. The base must be large enough to hold the bee in position without tipping over and the length of the standoff must allow the wings to spin freely.

Step 15: Make the stand base (part 11)

Cut the stand base from a piece of lumber that will be large enough to keep the bee from toppling over.

Mark the center and drill a 1" hole at the mark.

Step 16: Make the whirligig support (part 12)

Cut the support to length. The support must be enough to allow the wings of the bee to spin freely. On one end of the support drill a pilot hole and insert a long headless nail (part 13). This nail is the rotational pivot point for the bee.

Note: Don't forget to add the thickness of the base when calculating the length of the support.

Note: After inserting the nail into the support, I ground the head off the nail.

Step 17: Finish the whirligig support (part 12).

Insert and glue the support (part 12) into the hole in the base (part 11) and allow it to dry. Add a washer over the nail. This will contact the bottom of the rotational bearing and prevent the support from wearing away.

Step 18: Test the bee for rotation

Slip the rotational bearing of the bee over the nail on the stand. The nail top should not hit the wood of the bee. If it does, then shorten the nail. The wings should also spin freely.

Step 19: Paint the bee and the stand

Disassemble the bee and paint it with outdoor enamel.

First paint the bee with an enamel wood primer. After it dries, spray the bee body where yellow is needed. Trace or faintly draw the stripes outline on the bee and fill in the stripes with black enamel.

Reassemble the bee after you have completed the painting.

Hint: Use the stand to hold the bee while the paint is drying.

Hint: John Deere Yellow or a Canary Yellow spray paint works exceeding well for the yellow stripes. Use gloss enamel paint for a shiny finish.

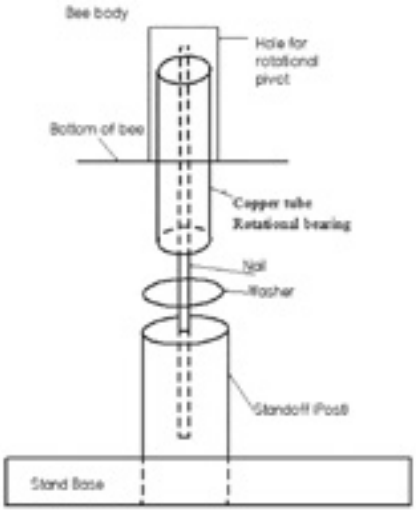
Usage

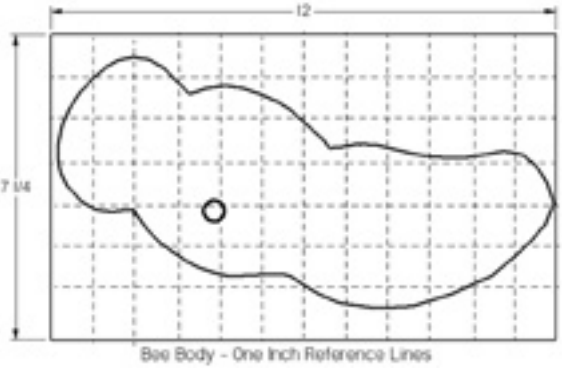
A whirligig needs a stand to position it, so it can catch the wind to twirl its wings and rotate its body. When placed in a garden it can be directly attached to a post or tied to the top of a fence.

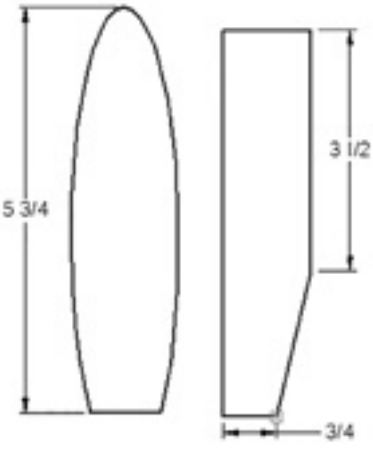
Conclusion

At a sales event this is an eye-catching display that will catch customers attention. Use this type of display to help you get the reward you deserve for your beekeeping skills. If you make two or more of these bees you have the start of a swarm and extras can be given to friends or used as door prizes at your bee meeting. A smaller version can be made to sit in your office or den. BC

Get a copy of Ed Simon's book Bee Equipment Essentials with detailed drawings, construction hints and how-to-use instructions for dozens of beekeeping tools and equipment from ***www.wicwas.com***. *Ed can be contacted through* ***SimonEdwin41@gmail.com***.







An Apology To Oxalic Acid

Frank **Mortimer**

When I was new to beekeeping, the first beekeeping course I took was titled, "Natural Beekeeping." The course was being held at a biodynamic farm, just a short 20-minute drive from my house. Because I didn't know about the great courses offered by the *New Jersey Beekeepers Association*, at the time, this seemed like the best option.

The course was team-taught by several people, some with more bee knowledge than others. They all had varying interpretations of what "natural" meant and some of these views were, shall we say, bordering on the extreme. Before I continue with my story let me make one thing clear, I believe that everything should be as natural as possible, and that the more natural the environment, the better it is for everyone and everything. However, I also believe that you need science to back-up and support what you do, otherwise it's just superstitious mumbo-jumbo. Some of the "instructors" at this course seemed to toss science, logic, and common sense out the window. For example, one instructor was explaining that her bees "know" where she needs to be stung, and when the bees sting her, they are sacrificing themselves to help her. If her back is hurting, BAM! She gets stung in her back. When her knee is sore, BAM! A few stings to her knee. But she said one thing in particular that will stick with me forever: "Every time I have needed to *see* something, really *see* something in my life, the bees have stung me in my *eyes*!" As I processed her words, I realized that "Every time" meant that this had happened to her more than once! MORE THAN ONCE!!! And, "in my eyes" meant, IN-MY-EYES!!!! I thought, and still think, that if I get stung in my eye, I may give up beekeeping and instead start collecting soft and fuzzy teddy bears. Certainly if it does ever happen, I'm going to take every precaution to make sure that it never, *EVER*, happens again!

At this point during the course, alarm bells were going off in my head. "Warning, Warning, Warning Will Robinson!" I am skeptical by nature, but now I was on high alert. When the topic of honey bee pests came up, there was a discussion of biodynamic farming principles, which included – and I am not making this up – the following instructions: Collect as many of the dead pests as you can, and during specific full moons throughout the year, you burn them to an ash, then sprinkle the burnt pest ash around your farm or hive so as to frighten, and keep away any remaining pests. The belief is that "no animal wants to cross over its own dead, so when they encounter an ash line made from their own kind, they will not want to cross it." Now, the last time I checked, not too many pests, insect or mammal, have sat down to watch *The Killing Fields*, so this seemed to make as much sense as wearing aluminum foil on your head to get a better Wi-Fi signal. One of the course instructors went on to say that you should collect dead *Varroa* mites, wait until the biodynamic farming calendar tells you that it is the *correct* full moon, burn them to an ash and sprinkle their remains around the perimeter of your hives. This is not exactly the type of mite treatment you read about in any of the scientific journals or hear that commercial beekeepers are using.

It was also at this same natural beekeeping course that I first heard about oxalic acid but because it was discussed alongside torching pests by moonlight, I didn't exactly embrace what was being said. To make matters worse, at that time, oxalic acid was not approved as a treatment for varroa in the U.S., and technically it was illegal to use in your hive. So hearing the words, "illegal" and "don't worry, it works" didn't give me the confidence that this was a scientifically proven way to deal with *Varroa*. Further, when it was explained that you vaporize the oxalic acid with a metal wand powered by a car battery, and you have to wear a respirator because the fumes could melt your lungs, I was thinking the only way this could sound more like Hogwarts was if you also sprinkled in some pixie dust and porcupine quills.

When the course was over, I had learned a few useful things. I knew that I needed to refer to reputable sources if I ever wanted to be a successful beekeeper, and the importance of differentiating fact from fiction when assembling my mite treatment regime. Throughout my tenure with *Apis mellifera*, I have read a shelf-full of books, and subscribed to both *Bee Culture,* and *American*

Bee Journal. I also have attended as many bee meetings as I can, especially to gain wisdom from a prominent researcher or experienced beekeeper. Throughout the years, I would read or hear about oxalic acid, but every time, I also started thinking about burning *Varroa* in the moonlight. Eventually, oxalic acid was approved to be used in the U.S., but I was still skeptical, as I could not separate it from those who had first spoken about it and everything else they had said, such as, "works really well, you just have to believe!"

Now fast-forward to about a year and a half ago. There was talk of something called "mite bombs," untreated hives that collapsed after being infested with *Varroa*. The mite bombs would infect other hives in one of two ways: 1) either the foragers would abscond from their hive and drift into healthy hives, bringing their mite infestation with them, or 2) bees from the healthy hives would find and rob out the mite-infested hives, bringing a lot more than honey back with them to their own hives. The biggest issue with the mite bombs was that the infestations would happen *AFTER* Fall treatments, so many times the beekeepers who thought their hives were mite-free and ready for Winter, actually ended-up with an after-treatment surge of mites.

Also in the past 18-20 months, there has been some question if *Varroa* could possibly start to build up a resistance to Apivar, the *Varroa*-killing silver bullet that most of us use as a treatment. So, the need to use another treatment with which we can rotate into an effective yearly mite treatment plan has become even more important. It was also reported by Cornell University that when varroa mites were first introduced to the U.S. in the 1980s, colonies could tolerate much higher infestations than they can today. The treatment threshold back then was a lot higher, between 10% and 20%, and mites could be effectively controlled with only one treatment a year. However, since that time colonies have become less able to tolerate such high infestations, and colonies often require multiple treatments throughout year. Randy Oliver, the renowned commercial beekeeper and researcher, states that treatment thresholds should now be 1% or less. It seems that our bees are less able to handle the stresses that varroa puts on them, and responsible beekeepers must do everything they can to actively control the *Varroa* levels in their colonies.

What I've learned is that oxalic acid works because it hurts the mites, but not the bees. While the research is not conclusive on all the ways it impacts the mites, it seems like the acid is absorbed by the mites' soft footpads, burning the footpads during the process, which also causes the mites to lose their grip on the bees and fall off. Note that oxalic acid only reaches the Phoretic mites attached to adult bees, it does not reach mites in capped brood cells.

While using oxalic acid as a treatment for varroa is relatively new to the U.S., it has been used for quite awhile in Europe and also in Canada. This past Spring, I was corresponding with a beekeeper in Sweden and I learned two important things: 1) Apivar is NOT approved for use in Sweden; and 2) oxalic acid is Sweden's #1 choice for treatment. This had a huge impact on me, as I could not imagine successfully treating for mites without Apivar.

Second, if an entire country was relying on oxalic acid to keep their bees alive, then I needed to realize that oxalic acid was a lot less of a magical potion cooked up in the moonlight and actually had some solid science behind it. The more I came across it in my studies, the more I realized that oxalic acid is used throughout the world and scientists have been studying it for years. I also read about the results of the Varrox® vaporizer field trials across seven European countries that compared the various methods of using oxalic acid for their effectiveness and impact on the bees. The study showed that the vaporizing method could be up to 99% effective for killing mites at times when the colony is broodless and vaporizing was the method that was the most gentle on the bees.

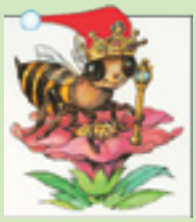
Which brings us up to today.

As I thought about mite bombs, colonies less able to tolerate *Varroa*, the need to alternate Apivar with other treatments, and that colonies are most at risk post-Fall treatment, plus everything I had been reading, it seemed like all of these things were pointing me in the same direction, and "showing me" what I needed to do. It was time for me to start using oxalic acid. And, I would like to add that I "saw" this without having to get stung in the eye!

It is well over a decade since I first heard about oxalic acid, but I have to admit that I now own, and sitting in my garage is a Varrox® Vaporizer, which is made in Switzerland and has been used throughout Europe for years, an extra car battery, as well as a container of registered and approved oxalic acid for mite treatments.

However, before ever donning my newly acquired respirator and heading to my apiary, I need to do one thing first. I need to apologize to everyone who has long known that oxalic acid is an effective treatment for *Varroa*. I'm sorry that I doubted you, and I'm sorry that I mocked you and your treatment of choice. You were right and I was wrong. I will join your ranks and as I do, I will chant, "The only good mite is a vaporized mite!" I will become one of you. But, as of this writing, one thing is still for certain and must be said, no matter how big of an oxalic acid apostle I become, I'm not backing down on what I think of moon-soaked *Varroa* burns at midnight. BC

All The Buzzz in...



Hello Friends,

Have a very happy holiday season. Be generous, happy, and very, very sweet to yourself and others!

www.meandthebees.com

Mikaila Ulmer

A social entrepreneur, bee ambassador, educator and student

What do you get when you cross a young girl with an old recipe, a bee sting, and a big idea? You get Mikaila Ulmer the founder and owner of Me & the Bees Lemonade.

When Mikaila was four years old she was stung by two bees in one week. Her parents encouraged her to learn more about honey bees. Knowing how important bees where, she wanted to use honey in her lemonade. Using her Great Granny Helen's flaxseed honey lemonade recipe, Mikaila launched her business from her home in Austin, Texas nine years ago. Now, at age thirteen, Mikaila runs a successful company and a nonprofit for supporting bee research, education, and preservation.

What does a day in the life of a teenaged CEO (Chief Executive Officer) of a company look like?

I go to school. I have to do my homework. I have to do my chores. On days off I do interviews. I might stop by the office or maybe do a demo or presentation. Sometimes on weekends or longer breaks I will go out of state. For instance, I will be going to Houston to do a presentation on being a woman entrepreneur. When I have extra time I work on my company.

What are the challenges you face?

Balance is definitely a challenge. I need to balance being a thirteen year old girl as well as being an entrepreneur and a student. It is really hard as a kid to be taken seriously. That has been a challenge that I've had to overcome by making sure my presentations are right so people take me seriously even though I am young.

Tell us more about your Healthy Hive Foundation.

Saving the bees has been my passion since I was 4 years old. Since then, I have been doing that by donating a portion of our proceeds to organizations that are helping to save the honey bees. Our nonprofit supports organizations like Heifer International, Texas Beekeepers Association (research) and the Sustainable Food Center of Austin

What are you excited about right now?

We are working on a book. We have a publisher and are just beginning the writing process. It is our first book!

Learn more about Mikaila, support the Healthy Bee Foundation, watch videos, join her newsletter, and see where Mikaila is speaking next by going to www.meandthebees.com

BEE a friend of Me & the Bees:
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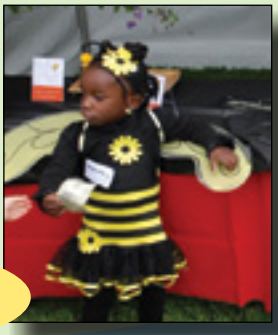


Mikaila in the early years of her business.

A2 volleyball and praise dance with her church, B7, C4 a dog and three chickens, D360,000+, E10, F3, G650+ Whole Foods Market, Wegmans, Natural Grocers, and many more, H4, I30+

... Bee kid's corner

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

Who are the people that have helped you along the way?
That's a long list. I like to call it my "Hive of Bee-lievers". I've had so much help along the way. If you are looking to be an entrepreneur it is very important to ask for help. Look for mentors. My parents have helped me from the very beginning. I could not do this alone.

What other things do you enjoy doing?
I train our family dog. I like to travel and read. I hang out with friends and go to the mall. I am a normal teenager but I also have a company.

What is one of your favorite books?
One book that I recently read that I liked was Geekerella by Ashley Poston. It is a twist on Cinderella.

What things are important to you?
My family, my friends, my school, having fun and being creative.

What is your super power?
Finding problems and helping people come up with different ideas to solve them.

Mikaila, Jacob, father Theo, and mother D'Andra.

What's Up in Mikaila's World

Winner on the TV show Shark Tank

Introduced President Obama at the United State of Women Summit

Celebrity Chef at White House Easter Egg Roll

Time Magazine 30 Most Influential Teenagers

Interviewed by ABC, CBS, USA Today, History Channel and many more.

Speaker at the 2017 NEXUS Global Summit (United Nations)

Going to Singapore next year to speak at the Women's Entrepreneur Network

Scholastic 8 Coolest Kids 2015

Buy a Bottle... Save the Bees

Mikaila and Me & the Bees By the Numbers

Match the numbers with the questions.

A. Sports	2
B. Favorite number	3
C. Pets	4
D. Bottles of lemonade sold last year	4
E. Percent of the profits that go to support bees	7
F. Main organizations that benefit from the company proceeds	10
G. Number of stores selling her lemonade	30+
H. Flavors of lemonade	650+
I. States selling her lemonade	360,000+

Beecome a Bee Buddy

Send two self addressed stamped envelopes and the following information to: Bee Buddies, PO Box 1693 Bastrop, TX 78902.

Name
Address
Age
Birthday Month
E-mail (optional)

We will send you a membership card, a prize and a birthday surprise!

Send all questions, photos and artwork to: beebuddiesclub@gmail.com or mail to the above address.

Meet Samuel Ramsey

Ann **Harman**

Sammy Ramsey has found out what the *Varroa* mites are having for their meals as they ride around on the bodies of our honey bees. His research results have changed the approaches to solving the huge problem V*arroa* has caused not only in the United States but also in many other countries.

Sammy's life began in Washington, DC, but soon his family moved to Maryland where he lives today. The joy of singing began very early in his life, before he was even talking. His favorite toy was a microphone attached to a toy tape recorder. So singing, into a microphone or not, has always been an important part of his life. He does not limit his music to any particular genre or style. He just loves music and singing.

Like many small children he was terrified of insects. Fortunately that attitude dramatically changed so that by the time he was seven years old he knew he would become an entomologist. For his undergraduate studies he attended Cornell University. During those years he focused on predatory and parasitic insect interactions that gave him an excellent background for his graduate investigations.

After Cornell he began research work for his PhD at the University of Maryland where he received his doctorate this year. His undergraduate studies fit perfectly with honey bees and *Varroa*. However, Sammy had noticed some problems with the *Varroa* and honey bee relationship, partially having to do with the white feces *Varroa* left in honey bee larval cells. Many beekeepers have noticed this distinctive poop as a sign that *Varroa* had infested bee larvae in those cells.

Now to take a step backwards in time, to 1995. *Varroa* was in the U.S. and causing problems. Dr. Allen Cohen did identify the white material, *Varroa* poop, left on cell walls as a purine, a chemical compound called guanine. He even thought that substance was strange if *Varroa* was feeding on the bees' blood, or hemolymph. For some reason that initial discovery was never followed by more research.

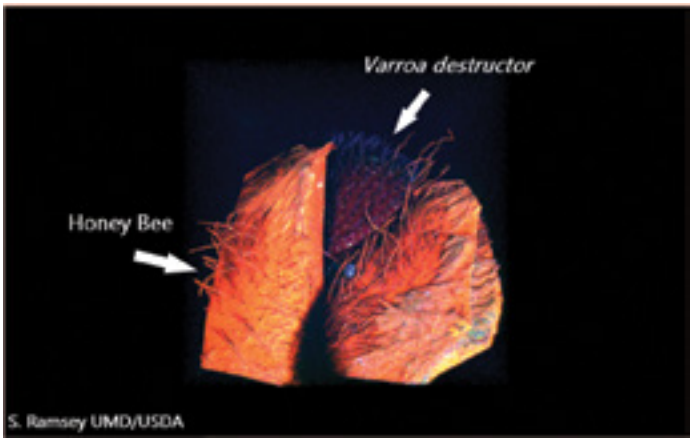
Let's step forward quite a few years to an interesting but not pleasant situation. Unfortunately Sammy's Dad acquired gout. Those people with gout have to avoid certain foods or they end up with a lot of joint pain. Fatty foods such as some meats, especially organ meats like liver, are on the list of foods to avoid. When digested, these foods will leave more purines circulating in the body which then build up in the joints. Sammy connected those fatty foods to avoid with the excretion of guanine by *Varroa*. He hypothesized that since the mites were excreting the chemical components that make up fatty organ meats that they must be eating a lot of some sort of organ meat just like people who deal with gout.

Sammy first looked at the digestive systems and the excrement of hemolymph-feeding parasites and found that those parasites, when compared with *Varroa,* were definitely different. While beekeepers do see *Varroa* perched on the tops of thorax or abdomen of honey bees, Sammy found that *Varroa* feed on the underside, or the ventral part, of the bees. Furthermore the *Varroa* had wedged themselves under the segments that make up the body covering of the bee potentially giving them access to a specific fatty organ in that area called the fat body. He then marked this organ with a biostain that only glows when attached to fatty tissue and marked the hemolymph with a different glowing marker. After this he exposed the marked bees to the mites. Sammy's "eureka moment" occurred – *Varroa* don't feed on hemolymph—they feed on fat body. (Many books will now have to be rewritten to reflect his discovery.)

Beekeepers do know that the "fat body," present in both the larva and adult bee, is essential to the bees' lives, especially for winter bees. This fat body provides the nourishment for the Winter bees to live and is essential for enabling the Winter bees to feed the developing bee larvae when the queen begins egg laying during Winter months. Inside the adult bee the fat body is mostly found on the bottom (ventral) side of the abdomen.

To verify his initial thought, Sammy conducted several more tests. He froze bees with mites on them in place and cut straight through them both. Under a fancy electron microscope, he was able to show

that the mites were destroying honey bee fat body tissue wherever they fed. Then he raised mites off of bees feeding them different diets of honey bee tissue, some with fat body, some with hemolymph and some with a combination of the two. Mites fed on hemolymph had the same results as those fed nothing – both died quickly. Those fed both fat body and hemolymph lived longer than those fed just hemolymph but the ones that lived the longest and laid the most eggs were the mites just given fat body.



After receiving his doctorate Sammy was employed at the USDA Bee Research Laboratory in Beltsville, Maryland. This lab, one of four Agricultural Research Service labs doing bee research, concentrates on bee health, such as diseases and parasites. His current project, based on his university research, is to figure out a practical way to kill the mites.

However, another Asian mite needs to be considered. It is called *Tropilaelaps* and it feeds on honey bee brood. So far it is found primarily in Asia (though this mite has moved to the Middle East as well). As we all know, small critters can easily make their way around the world on ships and escape detection until they become established. Sammy has already made one trip to Thailand and has met the mite (and don't worry, he left it there along with all of his equipment just to be sure). He is expecting to spend nine months in 2019 in Chiang Mai, Thailand, to study this mite's biology and behavior – and how this mite feeds. The results of his investigations there will be interesting.

Sammy also loves teaching. Although he is not at a university he is in great demand as a speaker. His presentations give him an opportunity to reach out to those interested in his favorite insect, the honey bee. Another aspect of his teaching is giving presentations on "How to Give Engaging Scientific Presentations." Everyone who has heard him speak at meetings will agree that his presentations certainly qualify him for teaching that topic! Although he does not have any beehives at his home, he calls his research hives his "bae-bees." They are very fortunate – he sings to them!

Today he is still singing – to his bees, in his church, to his students, at events and if you attend beekeeper meetings where he is a speaker you may be fortunate to hear him sing there as well. BC

Bee Culture recently did a podcast with Sam and it is posted at ***www.beekeepingtodaypodcast.com****. It contains even more information on this and other subjects Sam is involved in, including a gofundme campaign to help support his upcoming trip to Asia to do new research on the Tropilaelaps mite in Asia. This is truly the beekeeping community supporting beekeeping researchers. GoFundMe site for Dr. Ramsey* ***https://www.gofundme.com/fundhoneybeeresearch***

Meet Christina Grozinger

Jay **Evans**

I have the honor of sharing insights into the career and life of Christina Grozinger, Distinguished Professor at Pennsylvania State University and Director for the Center for Pollinator Research.

Christina was born in Montreal, Canada, in 1975 and emigrated with her family to the United States in 1978. She returned to Canada to attend McGill University, gaining a dual degree in chemistry and biology, followed by a Ph.D. in Chemistry and Chemical Biology at Harvard University. She developed an interest in honey bee behavior and, naturally, joined Gene Robinson's honey bee research lab at the University of Illinois, Urbana-Champaign for a postdoctoral fellowship. Christina went from there to North Carolina University for several years before joining Penn State in 2008. Below, she fills in the gaps and gives excellent advice for those interested in a career in science and on the challenges facing bees.

How did you get into science and who were your mentors on the way?

I loved biology and learning about plants and animals for as long as I can remember. As an undergraduate at McGill Unive in Montreal, I discovered that I loved chemistry too, as a way to learn more about the mechanisms driving the biology of living things. So, I obtained an honors in Chemistry and major in Biology, which probably made my parents very happy as they are both chemists (my father's work as a pharmaceutical chemist was actually highlighted in the book: Neverapine and the Quest to End Pediatric AIDS). For my graduate studies, I joined the research group of Stuart Schreiber in the Department of Chemistry and Chemical Biology at Harvard University, where I sought to use chemical tools to probe and better study the molecular pathways regulating how cells grow, function, and ultimately die. For my thesis, I studied histone deacetylases, which are key enzymes that regulate gene expression. I loved this research area, but I wanted to find something with broader questions – that would take me decades to answer, if they were even answerable! – to focus on for my future work.

I was interested in the genetic and neurobiological mechanisms regulating behavior, but I did not find most of the "standard" model systems for behavioral neurogenomics very exciting. Around this time, by brother, Stephan Grozinger, started keeping honey bees, and he would tell me fascinating things about their behavior. I then saw a PBS documentary on animal cognition, which included descriptions of bee dance language. I was hooked – this seemed like the perfect system in which to study the genetic mechanisms that regulate instinctive, complex, behaviors. I delved more into the literature of honey bee behavior and realized how endlessly fascinating bees were – and how little information was available about the neurogenomic mechanisms underlying these behaviors.

At the time, new genomic tools were being developed that allowed researchers to study "non standard" models systems, which made it a perfect time to take the leap into this new field. Many of these tools were being developed by Gene Robinson, and I was very fortunate to be awarded a fellowship from the Beckman Institute to join his team. As a postdoctoral fellow, I used these new genomic tools to study how queen pheromone triggers profound behavioral and physiological changes in honey bees.

What's your favorite honey?

It depends on my mood, and what I am eating it with :)

Where have you travelled in your studies of bees, what was most memorable?

Together with Maryann Frazier, Harland Patch (my husband), Elluid Muli, and many other collaborators, I have worked on projects related to honey bee health in Kenya since 2009. I was finally able to actually visit Kenya with Harland and our daughter Evelyn in 2017. This was a fantastic visit, not just to finally meet in person all of our collaborators at ICIPE (the International Centre of Insect Physiology and Ecology) and Southeastern Kenya University, and meet our network of collaborating beekeepers and their bees, but also to finally experience the natural beauty of Kenya.

What are the biggest challenges facing beekeepers moving forward?

Beekeepers have a lot of control over how the manage their own hives, but they do not have much control over what their bees are experiencing, in terms of weather conditions and landscape conditions. Bees fly several kilometers from their hive in search of food, and these distances can increase dramatically if foraging resources are limited. Foraging over long distances can be stressful, and during these flights, bees can be exposed to pesticides, pathogens and parasites. I am working with a team of collaborators from Penn State, University of MN, University of CA, Davis, and Dickinson College on a project funded by the USDA-NIFA-AFRI and Foundation for Food and Agricultural Research to provide beekeepers with an online portal where they can examine their surrounding landscape conditions and obtain predictions for how their bees will fare in different apiary locations, as well as suggested management practices they can use to improve outcomes. This information will also help others – including other stakeholders and policymakers – better understand current conditions for bees in different parts of the U.S., and how these have been changing over time.

What gives you hope? What are the coolest recent discoveries in bee science?

Two things give me a hope – first, there are SO many people interested in helping honey bees and other pollinators, that we are developing a very diverse community that spans multiple perspectives and skill sets to tackle these issues. This community can generate the trans-disciplinary approach that is needed to address bee health issues and help beekeepers. Second, technology is increasing our ability to gather data on both bees and their surroundings, and to analyze these data so we can better understand how to manage bees and our landscapes, despite the fact that there are so many complex and interacting factors impacting bee health.

Who supports your endeavors?

Everyone! My husband, Harland Patch, is a wonderful collaborator and partner, and together we bring different perspectives to many different projects. Our daughter, Evelyn (Evie) Patch, is an enthusiastic advocate for honey bees and pretty much every other insect. Through her efforts there are a lot of elementary school aged children in our town who are eager to help bees, and know what an "entomologist" is. I have been very fortunate to work with a multitude of outstanding collaborators, and mentor many dedicated graduate students and postdoctoral fellows, several of whom now have active research labs of their own and are training the next generation of beekeepers and bee scientists.

Any advice for students entering science?

It is important to find scientific questions that you are passionate about and committed to, and that you feel will have a positive impact on the world around you. This passion and commitment can help you overcome and persist through the numerous hurdles and setbacks that happen with every research study and project. It is also vital to surround yourself with supportive and creative people, who can help you when those setbacks happen and help stretch you into new directions and perspectives. BC

Meet Maryann and Jim Frazier

The names Jim and Maryann Frazier are very familiar in beekeeping circles. The scientific duo has been in the forefront of research into bees and pesticide's effects on these magnificent pollinators. Maryann and Jim were gracious enough to take time out of their busy schedules to answer some questions that I had for them.

The first question I had was a common one we beekeepers tend to ask each other:

How did you get into beekeeping?

Maryann: "The year I graduated from high school I was accepted into a youth conservation camp. One of the camp counselors had bees. At breakfast one morning she was excited and told me that one of her hives at home had swarmed and her fast-thinking brother caught the swarm in an old record player case and hived it! I was shocked! Why would anyone do such a (dangerous) thing? For the next hour I questioned her about honey bees. The things she told (bees can make new queens from workers, they can dance to communicate, they reproduced by swarming, etc., etc.), I was certain could not be true. I remember distinctly leaving that conversation telling myself that one day I'd have the chance to learn more about honey bees and when it comes along, I'd take the opportunity. That opportunity came two years later when I meet the technician of Dr. Al Benton. Benton was the honey bee researcher at Penn State where I was working on my undergraduate degree – he also taught a course in beekeeping. I took the course in my junior year and fell in love with honey bees. After teaching Ag Education for six months as a permanent substitute, my good friend and graduate student working on his PhD, Andreas Thrasyvoulou, talked me into coming back to PSU to work on a masters degree in Entomology specializing in apiculture. My advisor, Dr. Benton told me I could get the degree but that I should not expect to work in the field because I was a woman and there were no jobs. But I was very lucky and have never NOT worked in the field of apiculture. My first job was as the assistant state apiary inspectors in MD and then I landed a job as a beekeeping specialist – in Sudan."

Jim: "As a scientist interested in chemical ecology and insect behavior since the early 70s, honey bees have always had a special place in my heart. This originally began with my graduate course in Behavioral Genetics at Ohio State taught by Walter Rothenbuehler, where honey bees were a large part of our reading and discussion.

There is such an extensive scientific literature on them and yet there are also so many unanswered questions that the intrigue of generating new understanding as a researcher finds honey bees a quintessential target, it was during the CCD eruption of 2007 that Maryann first got involved and our hour-long commute to PSU campus daily each way gave us ample time to discuss things. My incessant 'why are you doing that' and 'why aren't you doing this' comments to Maryann finally prompted her to say 'well why don't you get involved!'. As any good husband would do, I followed by volunteering and joined Maryann and Chris Mullen as a team that quickly focused on pesticide impacts on bees."

How did you end up working at Penn State?

MF: "After completing my 2½ years as a beekeeping specialist in Sudan in 1989, I decided I wanted to continue to work in international development with honey bees. I came back to the U.S. and started my search for another overseas job. In the meantime Dr. Clarence Collison, who was the honey bee extension specialist at Penn State, asked me to come and work for him. *Varroa* had just arrived in PA. I agreed but made it clear that I would be leaving as soon as I could find another development

Jim and Maryann in Kenya where honey bees are thriving despite the presence of Varroa mites thanks in part to their work with local beekeepers there.

The Fraziers have "retired" to their farm and can be found staffing their booth at the farmer's market in Mount Union located about an hour south of State College, Pennsylvania where the two worked for years studying honey bees.

job. We wrote a grant to study *Varroa* that got funded. Then Clarence left Penn State to become the department head at Mississippi State. Two things kept me at Penn State; I had the opportunity to teach the course that turned me on to beekeeping (and did so in one form or another for the next 26 years) and in 1992 Jim proposed. We were married the following year and this year celebrated our 25 anniversary."

JF: "I knew Charlie Pitts, the former head of Entomology quite well through our mutual interests in insect chemoreception. He called at DuPont and asked if I might be interested in looking at Penn State as the new head of the department. He said knowing me and knowing the people there, he thought I might find it interesting. I went and discovered a collegial group of entomologists and within a few months transferred there from DuPont as department head. It was a most interesting choice for me as a senior scientist at DuPont, I could have stayed and gone into management, and probably spent the remainder of my career there, but I felt that I had a much broader understanding of Entomology as a science that was not being used there, but could find impact as a department head. I found the following 10 years both challenging and rewarding as we merged my industrial experiences with academic challenges to transform the departments programs."

How did you two meet?

MF: "At Penn State in the Department of Entomology – Jim came into the department as the department head shortly after I did. Essentially I married the boss!"

JF: "Maryann kept trying to fix me up with her sister, so I asked Maryann out to find out more and the rest is history."

How long have you been working with bees?

MF: "35 years !!! How is that even possible!"

JF: "As I indicated it was the 2007 period of CCD emergence that I began to focus on honey bees as a new bee scientist. I knew the scientific literature on bees was extensive, but never really appreciated how extensive, until I began immersing myself in it looking for where the current level of understanding was about pesticides impacting bees. One really interesting revelation was that the insect toxicology literature had always focused on how one achieves the field exposure to a dose that will kill greater than 95% of the target pest insect, with very little fundamental knowledge of how a dose less than that might impact the physiology and behavior of the target pest, or even of non-target pests that might get some incidental exposure. In the case of systemic pesticides like neonicotinoids the transport from treated seeds into the plant always results in concentrations in nectar and pollen of the plant that are below highly toxic levels, but can have multiple kinds of sub-lethal impacts. This was an area for which practically no data existed and one that we have been focusing on, as has the bee research community, in the last 10 years.

What is the most interesting thing you've discovered about pollinators/bees?

MF: "How much stress honey bees can tolerate."

JF: "The myriad sub-lethal impacts of pesticides on bees of all kinds has emerged as a major focus of relatively recent bee research. A good summary of this can be found in the IUCN report of the Worldwide Integrated Assessment of Systemic Pesticides (**http://www.tfsp.info/assets/WIA_2015.pdf**). The other thing was from a farmer funded project that Maryann and I did on native pollinators on red raspberries on our farm and two other organic farms. We found to our surprise that the commercial production of red raspberries had evolved to cut the first flush of canes and force the plants to regrow so that once they started to fruit, this would continue until frost. That shifted the blooming period after the flush of native bees we found on our wild red raspberries, and inadvertent consequence of an agronomic practice adopted for market concerns, but without the input of critical pollination biology."

What was the most challenging study you participated in and why?

MF: "Everything we have done related to pesticides. Because honey bees colonies are so variable and resilient, working on the impacts (especially sub lethal) of pesticides in field studies, was very challenging; trying to have enough replication, keeping colonies alive long enough to see effects, and separating the effects of the pesticides from other factors such as *Varroa*, viruses and environmental issues was very difficult and frustrating."

JF: "We really began without any knowledge of how much pesticide bees were actually being exposed to and how much they returned to the hive. We were the first group to have a wide range of bees and hive matrices samples analyzed for pesticides and these levels greatly exceed our expectations for the quantity and frequency with which they were found. It took us several years of field season research to develop a protocol that would allow us to generate a cause and effect consequence for bee colonies of known pesticide exposures."

What was the most rewarding study you participated in and why?

MF: "The most important study was our (Chris Mullin, Jim and myself along with Sara Ashcraft) 2010 survey of pesticides in hives. I describe it as

the best awful work I've ever been involved in. It was so disturbing and at the same time so critically important to discover just how much pesticide was accumulating in beehives. The most rewarding work was being on the ground in Kenya and helping the Kenyans come to the realization that *Varroa* was widespread there. When consulted on what they should do to control varroa I was able to encourage them to do nothing, other than monitor. The honey bees in Kenya now seem to be tolerating *Varroa* without serious consequences."

JF: "The study of pesticides in bee hive matrices published in 2010 in an open access journal (**https://doi.org/10.1371/journal.pone.0009754**) has received more than 90,000 reads and more than 500 citations."

There has been a lot of media attention on the plight of the honey bee and wild pollinators in recent years. What is your take on this situation?

MF: "There is media attention because people are interested (a chicken-egg thing). I think our generation grew up with honey bees covering the clover that grew freely in our lawns. Who among us has not stepped on and been stung by a bee? The absence of these bees now really resonates with people. Deep down they recognize that something important is missing from our environment and want to know why. It gives us as beekeepers a perfect opening to talk about the importance of pollinators and their plight, especially the over use of pesticides in this country."

JF: "The multiplicity of factors that are interacting to impact bee population dynamics is a complicated and complex phenomenon that varies over time and location. Individual beekeepers are struggling to keep up, but the research community has generated a plethora of new information on these factors and their interrelationships over the last 10 years. Scientific consensus has begun to emerge as referenced above. Pesticides have gone from the bottom of the list of relative importance to the top of the list for the major factors of pesticides, parasites, diseases, nutrition, and genetics. There is a corresponding, but less extensive scientific literature developing on these impacts on native pollinators as well as the interactions of the pollinator community members on each other and their integrated ecosystem contributions. As this focus continues, we should have a much better basis for making agronomic and policy level decisions about how to sustain their major contributions to our food system and our environment.

What research project(s) are you working on currently?

JF: "Jim and I are now retired and live full time on our lovely farm in Mount Union an hour south of State College. I love being a beekeeper, making honey and selling it at the farmers market. But I am involved in three (citizen science) research projects: PSU land4bees, a project that collects hive data across the state and maps forage to evaluate apiary location quality; a monthly pollen collecting study; and a queen evaluation study to assess *Varroa* resistance in "Purdue leg chewers" being carried out by the PA Queen Bee Improvement Project. I am also leading beekeeping tours to Kenya! What to come along???"

JF: "I am doing some limited consulting as a bee scientist on legal actions involving beekeepers and pesticide impacts on their operations."

*For more information or to register for a beekeeping tour to Kenya, contact Maryann at **MFrazier@psu.edu**.*

Meet Treasure Valley

Part of my job at the UGA bee lab is extension, which means I get to travel, teach classes, talk to clubs/associations and present research at various meetings. Traveling has been a highlight of my career, but what has been even more rewarding is getting to meet such generous and interesting people. To date, all my experiences have been wonderful, but one in particular, stands out. That's when I met the members of the Treasure Valley Beekeepers Club (TVBC).

The club is located in Boise, Idaho and let me tell you, these folks know how to run a bee club and have a blast while doing it. They also know how to treat their guest speaker. They were extremely organized on the details of the trip; what to expect, when and where my talks would take place, where I was staying, etc. After being picked up at the airport by five members of the group, the next thing I knew, I was swept off to meet the Lieutenant Governor of Idaho. Then, they took me out to a fabulous restaurant, where the rest of the crew was in attendance.

During dinner, we chatted about this and that, and somehow, I was reminded about the time I met Leslie Nelson. Here's the story I told them that night and it'll eventually make sense why I am writing about this in a beekeeping magazine.

Back in my college days (the first time) Leslie Nelson (the most incredible comedian and actor) was starring in a play in which I was working as a backstage hand. The last night of that play, myself, along with the other theatre

Jennifer **Berry**

The entire crazy crew of the TVBC watching the total eclipse

nerds, gained the courage to ask him if he would like to join the crew for some food and drinks. Leslie quickly accepted and I had the privilege of bringing him to our apartment. Once there, the entire theatrical department was crammed into our small kitchen with Leslie front and center. We offered him homemade tamales and scotch which he gladly accepted. After several minutes of nervous questioning from the "panel," I heard a noise emanating from his chair. It was the kind of sound that can throw you into fits of embarrassment, a sound you pray never escapes you and is heard in public, a sound that you never heard from your mother, a sound only meant for the privacy of the bathroom. You know the sound of which I speak!? Well, it happened in the company of Leslie Nelson.

After the sound dissipated, you could've heard a pin drop since we were all in shock that Mr. Nelson actually "tooted" in front of us. To not embarrass him further, we quickly started up the conversation, asking questions like "what was it like to be in *Airplane*, how did you get into acting, who's your favorite director"? Not five minutes later, another louder, rumbling sound exploded into the air. Once again, the conversation ceased for a few short seconds and then quickly picked back up trying to recuperate the discussion and ignoring what had just happened. This went on for some 20 horrible minutes or so, with each toot becoming louder and longer in duration. Maybe he couldn't hear what was happening, or maybe he didn't care, I thought, but either way, I was dying inside, since it was I who offered him my roommate's mom's, homemade tamales. It was my fault his internal organs were rebelling.

Jennifer Berry being arrested at the Capitol for giving Idaho's Lieutenant Governor, Georgia honey.

Just when I was about to call 911, the loudest, longest toot that I've ever heard, radiated from him. Once the rumbling ceased we were dumbfounded and terribly embarrassed for this poor man we all practically worshipped. That's when Leslie, sorry Mr. Nelson, lifted his right leg, revealing a pink whoopi cushion, and tossed it into the air. As it flopped on the table he said, "relax folks, it's called a practical joke!" It took several seconds for the image to register in my brain and the brains of the others, but once we all realized what had just happened, the room burst into fits of laughter. Leslie then proceeded to tell us all the ways he had played tricks on people over the years with this very same bubble gum pink, whoopi cushion. The rest of the evening was perfect!

Fast forward 30+ years, I'm telling this story at dinner to the TVBC group. The next night, after an exciting day of sight-seeing, was the annual pub crawl where we travel from pub to pub adorned in bee attire and then end up at an awesome dinner spot. There's 20+ people in the room. Dinner is over and we are just wrapping up dessert. That's when I start hearing some strange noises emanating from around the room. They had purchased several dozen whoopi cushions and proceeded to pull the same gag on me. Believe it or not, it took several "passages of air" before I caught on what was happening. I love practical jokes and boy did they pull one on me.

Ok, enough discussion about the trials and tribulations of irritable bowels. Let's get on with the show. The December issue is one of my favorite articles to write, not only because I get to feature someone special, but also because I get to know this person even better. Always a fun time. But this year, I had a REALLY hard time trying to decide who to highlight from the TVBC since they are all awesome. So, instead of trying to pick just one, I've decided to highlight several in the club that wanted to be a part of this article. This group has become one of my favorite ones to talk to, talk with, and play. Each member received the same three questions.

1. What prompted you to get into beekeeping?
2. How does the TVBC benefit the Treasure Valley?
3. How has the TVBC benefited your beekeeping experience?

Here are their unabridged answers to these questions. Let me introduce to you, the one and only crew of the Treasure Valley Beekeepers Club (TVBC).

Kevin "Kebin" Duesman – Past president 2015, Founding Member of the TVBC & Great Guy!

1. It was a Christmas gift from my wife Liz. Twenty-

Kevin "Kebin" Duesman, founding member and his wife Liz.

three years ago we were at my Dad's funeral telling funny stories about his life and there were a few about him getting "stung up" while working with bees. Liz remembered these stories and a couple months later there were these large boxes under the Christmas tree. Two hives grew into over 20 hives today.

2. Our club is very alive; we have a core of 15 or so that make it work. We have a big focus on helping in the valley with swarms, schools, state fair, our Foothills facility and bug day. We also provide great information with our meetings, mentor program and teaching for the Oregon Master Beekeeping Program.

3. When I started beekeeping I had no local resources for help or advise. There was no Google or YouTube, just books. I learned the hard way. The club became a great conduit for information from many beekeepers. It also helped bring great speakers to Boise. Another benefit is the great friends I have made with this club.

Karla – Past President & Great Gal!

1. For me, beekeeping started as a bit of a selfish interest. Simply wanting to increase my raspberry yield, I spent some time during an Idaho Winter reading about honey bees and pollination. I ordered some equipment and set my husband and boys to work building boxes and frames. Finally, I bought two colonies in the Spring. My family thought I was crazy! Our berries increased from two gallons to eight that first year. Sadly, I learned the hard way that there was so much more to learn with my newfound hobby.

2. Not willing to give up, I joined the Treasure Valley Beekeepers Club. Early on, I discovered a wealth of information from some seasoned beekeepers (meaning experience, not necessarily age). They were happy to share their knowledge, their successes and failures and even their beer and pizza!! It was easy to make the time to attend meetings because the core of this club centered on sharing beekeeping knowledge, resources and helping to educate the Treasure Valley on honey bees. But what kept me returning and wanting to get involved were the friendships and generosity of the members. The willingness to help was far beyond the casual introduction. It was – and still is – a genuine willingness to help and educate and share.

3. I can't say enough about this club! That deep friendships built through the common denominator of bugs may sound crazy. But the last seven or eight years have been full of an incredible amount of beekeeping, education mixed with fun, friendships and maybe a tiny bit of beer and perfectly grilled brats! Long live the TVBC😉

Marc von Huene – President of the Hewlett Packard Boise Bee Club and **Great Guy!**

1. Curiosity was the start. After attending an in-store seminar and seeing how easy beekeeping was, we decided to give it a try. Buy your wooden ware, a few tools, a package of bees and life is good, right? It only took one season to lose both my queens.

2. It has encouraged the spread of small scale hive ownership throughout the area. Whether anyone knows it or not, pollination throughout the valley has increased greatly through the hundreds of hives that might not have otherwise been cultivated. It has also provided encouragement for people to continue even after losing their hives, present company excepted.

3. It has given me access to enough mentors to become a beekeeper. I firmly believe no one can be successful in beekeeping today without a local mentor. I've been at it for six years and learn something new virtually every week. And it has provided a means to give back. I've been fortunate to have mentored dozens of people in the club and elsewhere.

Frank Grover: AKA Uncle Frank – Sturgeon Fisherman & Great Guy!

1. I am a farm kid from rural Idaho. I raised all the animals and fowl imaginable, but when a friend took time to show me a hive and a queen, I was hooked.

2. When I moved into Boise City a few years ago, there was a newly formed bee club. The number of people who helped the club run smoothly is much larger than any other club of any kind I had seen. They were excited to share information, and use the club resources to further our knowledge. They brought in speakers, purchased better bee stock to share via a queen cell program, and improved the genetics of bees kept by hobby beekeepers in the club. They also organized the ease of the public's ability to reach a beekeeper when they had a swarm via a swarm button on the club website. They partnered with Oregon State University to offer a Master Beekeeping Program in Idaho.

3. For myself, the benefits have been huge. I have improved my skills more in the last 10 years then in

Mark Davis and Uncle Frank.

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Clarence H. Collison

Melinda Jean Stafford, current president.

the previous 20, just from hanging out with these bums. I have gained many friends, not just surface friends, but good friends, that are always including you, and looking out for you, like the time I got injured by a table saw and a large crew of beekeepers showed up and extracted my honey for me. I also gained friends that encouraged me to try things that I may not have done, like queen rearing, which turned out to be very rewarding.

Melinda Jean Stafford - Reigning President of TVBC, the Boise State University Bee Team Advisor, Alumna from UGA and Great Gal!

1. Beekeeping fell into my lap with a job I was hired for at Boise State. But, I found that I really enjoyed the hobby beyond what my job at the time was asking me to do. My boss connected me with Steve Sweet who really took me under his wing. He spent time mentoring me with the Boise State rooftop hives, invited me to TVBC meetings, and even asked me to help occasionally. His persistence and passion for bringing young people into the club really intrigued me so I kept coming to events. Eventually, I felt confident enough to purchase my own hives (aside from Boise State's). I don't think I would have personally gotten into the hobby if it had not been for strong mentors and the community I found in the TVBC.

2. So many ways! The TVBC benefits the greater Treasure Valley by offering free services to the community - swarm catching, educational presentations from our local experts, and open resources to answer questions about bees. The TVBC also advocates for beekeepers by working with city officials to create bee-friendly ordinances that allow for urban beekeeping. Our club has a strong presence in our area which has allowed good and accurate info about beekeeping to be accessible.

3. Mentorship**.** This is a key factor to success for new beekeepers. Beekeeping is hard! Textbooks and YouTube videos can only get you so far, but the help from a local, experienced beekeeper is invaluable. Our club offers new beekeepers a sense of community and opportunities to build relationships with others who have been-there-done-that.

Rena - Current Treasurer & Great Gal!

1. The reason I got started in beekeeping was that I saw my granddad doing this as a small child in Buhl, Idaho. He did it to supplement his income during World War II when there were sugar rations. Fast forward to 2012. I got bored and checked in to community education classes and there it was – beekeeping – and it sparked a memory. Jeff Bergland and Kebin Duesman were teaching the class and they did it with their usual humor. They made it look like fun!

2. I went to the monthly TVBC meetings to learn as much as possible before jumping right into it. Watching Steve Sweet literally stand up on a chair and preaching about "managing your mites" has been a mainstay of the club for years!!

3. I am proud to be a member and treasurer of this fine club and all of its awesome members. The club has grown exponentially over the years and we are spreading best beekeeping practices over the valley every chance we get. Not just to adults, but we are reaching out to future beeks as well. Many of our members have taken the Oregon State Master Beekeeping classes and gotten their apprentice Certificates. We have journeymen, and a couple of masters in the club as well, impressive! I don't know if other clubs call in the rock stars every year like we do, but they should. The educational experiences are phenomenal plus with reasonable club dues, and fundraisers we are able to make things happen. It's fun to be able to run ideas off the best minds in the business!! I will call it quits at this point.

JB (Mobsta) Alexander (I must say Great Guy or he'll break my legs;)

1, 2 & 3. I got hornswaggled in by my wife Rena, then I became "The Mobsta" because I can get everything for free for the club (especially Alcohol) :) Then I fell in Love with the club. Nicest family I have ever had.

Jeff Bergland – Past President & Great Guy!

1, 2 & 3. I'm a transplant from St. Charles, Illinois. My father, George Bergland, as a kid from the age of 10-12, had his own apiary on his family farm in Wasco, Illinois. As I was growing up I had a fascination with bees, but was never given the opportunity to work with them. During my adulthood, my father kept telling me that I should really give beekeeping a try. Well, once I moved to Boise, Idaho and bought a home, my wife Anne paid for me to take a beginner beekeeping class at the Idaho Botanical Gardens. The instructors of that 2010 class, among a few others, were Steve Sweet and Kevin Duesman. After enjoying their lecture on honey bees, I was immediately enthralled in the hobby of beekeeping! Further enticement came from Mr. Sweet when he gave me a bottle of his honey labeled "Sweet Honey", which he professed was a "cure for all that ails you". With honey in hand and some pretty severe pollen allergies, I started eating his honey on toast, adding it to tea and cooking with it. Within two short weeks my allergies were gone and I didn't need to take medication anymore. Wow! Now, I really wanted to raise bees for my own health benefits! I immediately ordered some hive boxes from a bee supply company and acquired some nucs from a couple of newly made friends in the Treasure Valley Beekeeper's Club. As a result of my interaction with the TVBC and with virtually no substantive knowledge in beekeeping, I was elected President of the Treasure Valley Beekeepers Club (TVBC) in 2011, for a two-year term. As of 2018, I have been beekeeping for seven years and actively maintaining nine hives. I really enjoy teaching classes and sharing information on the benefits of all thing's bees and other beneficial pollinators. I even got involved in the Oregon State Master Beekeeping classes. I completed the program and I am now a Journeyman Beekeeper.

Steve Sweet – Past President & Treasurer, Plus Founding Member of the TVBC and a REALLY Fun, Crazy, Great Sense of Humor, Intelligent, Caring and Loyal to the Core Great Guy!

1. "A long time ago in a land far, far away . . ." (actually 1972 in Davis, CA), I lamented to a friend that Organic Chemistry was apparently going to be my demise, yielding a lightsaber to the heart of any college graduation aspirations. At his suggestion, an appeal was made to the Academic Senate to substitute Entomology 101 for the science credits as ascribed to Organic Chemistry. Under the tutelage of Dr. Norman Gary and Dr. Harry Laidlaw, the full course of beekeeping classes, including a graduate class in queen rearing, more than fulfilled any science credits. Coupled with a stint as a work-study student, I became adept at lifting heavy boxes, cracking hives for the researchers, picking up discarded burr comb, sweeping floors, stacking empty equipment, mixing up tanks of sugar syrup and loading trucks.

2. With the advent of the idea of a TVBC, graciously fostered by the Idaho Honey Industry Association in the Winter of 2007, a disparate conglomeration of individuals from across the Treasure Valley (Mountain Home, ID to Ontario, OR, generally ranging along the lower Boise River) united under a common appreciation of one species of insects. The wide range of individuals and experiences has been astounding. We have university staff, students, and teachers, a plethora of high tech reps, title officers, outside salesmen, a wide range of medical professionals, financial officers, legal minds, emergency services personnel, and retired individuals. You name it! Over the years, commercial beekeepers throughout the Valley and nearby areas (Noyes Apiaries, HoneyGold/Cox, Treasure Valley Bees, Golden Bee, S&W Honey) have also been tremendously supportive of the hobbyist contingent. Our wide range of individuals, united behind the honey bee, brings together a very broad life-experience and generally people very tolerant and accepting of new ideas. We are indeed fortunate to have such a highly motivated and sharing people dedicated to successful beekeeping.

On top of the strong foundation of individuals, the TVBC is blessed with a very dedicated troupe that is willing to be active in club leadership roles, club activities (education through the Oregon Master Beekeeping Program, Pollen Paddy Parties, Crack Candy Board Parties, etc.), community outreach (Foothills Learning Center, Western Idaho Fair, Bug Days) along with special programs, such as sponsoring our 2017 Total Bee-Clipse with Dennis vanEngelsdorp, Randy Oliver, Steve Sheppard and friends.

Over the years we have also had some truly wonderful talented beekeepers come to Idaho to help spread the word, including: John Miller with a sold out special showing of the then-new movie "More than Honey," in which he was a central protagonist; and other National Honey Bee Day luminaries such as Kim Flottum, Randy Oliver, Dennis van E(mentioned earlier), Jan Lohman, Ellen Topitzhofer, Dewey Caron, and of course, ***Jennifer Berry***.

3. How has the TVBC benefited your beekeeping experience?

Steve Sweet, founding member.

Personally, my beekeeping practices have needed to evolve under the onslaught of mites, Deformed Wing Virus, and what seems to be a plethora of other ailments, foreign to when I was originally introduced to honey bees. Honey bees seem to represent the harbinger of a constantly evolving environment. In order to be able to succeed under these continually varying conditions, one must maintain constant vigilance and be prepared to constantly change. Staying with the same ol', same ol' is a recipe for disaster in the beeyard. Being involved in the TVBC has brought me closer to a wide variety of individuals interested in both the science of beekeeping and the continual commitment for improvement in beekeeping practices.

On a personal note, the support the TVBC has obtained from the Oregon Master Beekeeping Program and all the wonderful and supportive individuals that have passed through our little part of Idaho, have been extremely gratifying. The support of national organizations, such as the Western Apicultural Society that recently held its annual convention in Boise this last August has also benefited our local beekeeping experience. The excitement generated by a wide-array of highly talented, internationally respected beekeepers right here in the Treasure Valley has improved the outlook for successful beekeeping here for years into the future. SS

As you can see, the enthusiasm these people have for teaching folks about bees, keeping their bees alive and helping each other, is amazing. I wish they lived closer so I could hang out with them more often. They treated me like gold, kept me well fed, made my stay in Idaho fun and entertaining, and even shipped me a box of rocks (I'm a bit of a rock hound and collect them wherever I go). If you live in the area, make your way to one of these meetings. You will learn how to keep your bees happy and healthy, and make friends for life. BC

Take care of you and your bees!

Carla Marina Marchese

HONEY CONNISSEUR

So, as long as this is the interview issue, this time I thought I'd add my two cents worth and bring some attention to somebody I've had the good fortune to be associated with for over a decade. Carla Marina Marchese and I met a bunch of years ago at a Backyard Beekeepers meeting in Connecticut. An old and dear friend, Ed Weiss was being honored and I was invited because Ed and I go way back, before I came to Ohio, working together on various Connecticut beekeeper issues.

Not long after that, in 2003 Kathy and I ran into her at the National Honey Show in London, which was sort of a surprise for all of us because the three of us were the only Americans in attendance. Though short, it was educational for all of us, and it was my first experience really at honey tasting. Her interest in honey was evident even then however and over time we kept in touch, because my interest in honey sort of paralleled hers but mine has always been in the plant world, hers in the finished product – the honey from those plants. I even got her to do an article or two on the subject.

But for the 10 years or so before that, Marina was in business. She runs a small, varietal honey business, sourcing varietal honeys from where ever she can find them for customers, primarily up-scale gourmet food shops, and cheese specialists in the ritzy parts of New York City. She deals in only the best of the best, and pretty much only wholesales to these specialist customers. Because of her branding and clientele, she doesn't have to do a lot of advertising or promotion. Word of mouth from one top chef to another, from one top shelf cheese seller to another seems to work best, and, as she says, the business seems to run on its own. Reputation is what works here, and hers is definitely top shelf.

As part of this were years of making beekeeper crafts – balms, salves, and soaps all using essential oils like lavender, orange or eucalyptus – and your memory of these aromas gets razor sharp. Along with these experiences, she worked for an Italian wine importer to learn the tasting techniques, and has sat in on as many wine, chocolate, olive oil, coffee and cheese tasting classes as she could find to learn the methods and vocabulary and techniques of 'tasting'.

Plus, she had years of experience simply tasting honeys to make sure they were what the seller said they were. As she puts it – sampling, tasting, smelling, bottling, pouring, wiping drips, labeling, licking fingers, spoons and spatulas – all was tasting experience.

One anecdote she shared. "Over the years I've spilled my share of five gallon pails in my bottling room and had to mop it up. Once you spill that much blueberry or orange honey on the floor, and then spend hours cleaning it up, you can guarantee that you will remember the color, smell, flavor and texture of that honey!"

But the concept of terroir was new to me, but made perfect sense – take any honey plant, say white sweet clover, and grow it in a slightly acidic soil and you will get a honey with a definite, particular taste. But grow that identical plant in a slightly basic soil, and you will get a honey with a somewhat different flavor, aroma, taste or color. Soil is often the greatest change maker, but the total environment the plant grows in has an effect. A Honey Connoisseur, like a Wine or Olive Oil Connoisseur knows these differences and takes them into consideration when tasting any of these products. I used to know a honey taster from Sioux Honey that could tell the difference between sweet clover honey from Montana and Minnesota. I didn't know then the minute differences terroir could make. Marina opened my eyes to that concept.

So about six or so years ago we were talking, and in that time she had really explored honey tasting, and terroir's affects on the plants honeys were from. She also spent time learning the vocabulary of expressing color, aroma, taste, flavor, and the essence of tastes – salt, sweet, bitter, sour, and savory, and how to use your nose to gather flavors and memory to identify how any particular honey tasted.

So we put our heads together and came up with the idea of *The Honey Connoisseur*. The book would explore more than 30 different honey plants – where they grew, what was special about them, what issues there were about growing them, and what affects, if any, terroir would have on their growth. Marina then would discuss in detail the qualities of the honey these plants would produce and how to taste to tatse and describe them. Once we had the plant list solved, the rest went pretty fast though it was an interesting, learning and enjoyable process to make it happen.

But there was so much more to this than I was prepared for.

Chapter five. How to taste honey. Marina's skills, education and experience really came to light here. She talks about color, aroma, the history of sensory analysis, taste and flavor, and she actually developed the first tasting wheel for honey, much like those for olive oil or wine. Her glossary of tasting terms is particularly useful for this.

Then we worked on how to select good quality honey – finding a reliable source, the container the honey is in, the label and certainly the taste. Add to this the pairings we tried – with cheese (see her article this month, which led me to think about Marina as an interviewee), and other goodies.

And finally, she produced some recipes that use specific honeys to make them special. Working with her on this project was truly a delight, and today she continues to sell these honeys as her RedBee Honey Business, she holds tasting sessions, and educates anybody interested – beekeepers, chefs, other tasters of good food.

And of course now there is the American Honey Tasting Society she founded, a formal organization that functions to organize and educate all of the rest of us on the finer points of how to taste honey. This organization is as sophisticated and professional as any wine or olive oil school is because it was founded on the same concepts as old school educational organizations. If, and when you want to take the next step in the art and science of tasting honey, this is the place to go.

And tasting honey, really tasting honey is an art, a science and an experience I hope you get to enjoy. It is one more miracle you and your bees get to partake in.

The Intrepid, Delightful Roberta Glatz

Grai **St. Clair Rice**

Beekeeping gets better with experience. Honey bees, as well as beekeepers, get infinitely more interesting. Each year brings new depths of understanding, and this wisdom, when it is shared, is invaluable. The way it is shared makes all the difference in its resonance with the general public and the next generation of beekeepers.

Observation, experience, a love of learning and of teaching are all things that come naturally to venerable beekeeper Roberta J. Glatz. At the age of 94, she still exudes a youthful edge interested in scientific knowledge and intrigue in the world of pollinators. She is a little impish in her seriousness, and always seems to have just the right tidbit of profound insight into honey bees to match the moment.

You may have spotted Roberta at a beekeeping conference or, if you are lucky, seen her presenting at a bee club meeting. This Summer, Roberta once again attended the Eastern Apiculture Society conference, where in 1974 she became one of the first female presenters at this regional event. She relishes attending the American Beekeeping Federation meetings and thrives on the expansive international energy of Apimondia, which she

Roberta, circa 1980s. Peter Glatz photo

has been attending worldwide since the 1960s.

After a number of bear attacks, Roberta decided approximately 15 years ago to retire from active beekeeping and move deeper into the world of research and teaching. She remains an engaged and active member of the beekeeping community. Roberta is currently a veteran member of the Apiary Industry Advisory Committee to advise the NYS Commissioner of Agriculture on matters related to honey bee health. Although not a specific member of New York State's Pollinator Task Force, Roberta has attended every meeting since its founding in 2015, where she speaks up as often as necessary, keeping an educated, watchful eye over apiculture issues.

Roberta is a much sought-after speaker for beekeeping organizations, in part due to her ability to engage her audience through wit and story structure. She no longer brings her carousel of slides, which jammed in antiquated equipment, yet she can hold the rapt attention of a room full of beekeepers with her insightful tellings of beekeeping observations and experiences, with visuals conjured in the mind's eye of the listeners. "You're not the Boss of Me," "Bee Smart" and "Before the Swarm" are some of her recent talk titles, with past talks including "An Illustrated History of Beekeeping in Russia."

Roberta's delivery and ability to convey information were cultivated during a long career teaching foreign languages in schools, with high school students being a specifically challenging audience.

Good teachers have a way of engaging our minds and activating our abilities to make connections with the world around us. She has been known to use a bit of shock to get people's attention, which works well when a 90-year-old woman is in front of the room talking about sex and virgins in her humorous, yet matter-of-fact, way to make a point about swarming.

Formative, Family Years

Roberta was born in Albany, New York on June 21, 1924. As the oldest child in her family, Roberta proudly held the smoker and helped her father in his beeyard at the formative age of five. Nature and observation were part of daily life in the Van Auken family with Roberta's mother being a youth leader in Albany's first Girl Scout Troop, inspiring adventure, including campfires at the dining room table!

"Boredom was not tolerated in our family," relates Roberta of her childhood. Her mother would stop and point at a crack in the sidewalk and ask her children to describe what they saw. "Open your eyes and look at the world – really look" was the directive given. This beginning is elemental, and feeds Roberta's love of nature and reliance on quiet observation to inform.

Roberta had wanted to pursue the sciences in her education, however she chose to play field hockey in the afternoon at school, and had heard that Spanish studies were more fun anyway. The times were such that teaching language was a more secure option for a woman, so her practical self took hold. Roberta strives for excellence in everything she does, and continued her studies into the late 1960s. She holds an MA in Spanish and German Language and Literature, and an MS in Education. She began a PhD degree in Language and Literature, although she never completed her thesis because her advisor passed away.

Glatz children – Jan, Patti and Peter with honey products.

Roberta married in 1949, and settled on a 90-acre property with a rambling building, that had been a wagon stop on a route from the New York State capitol westward. There, she eventually raised four children and countless bees, and still resides in the comfort of her collected history.

On a language Fulbright to Germany in 1957, Roberta was reacquainted with the goodness of honey and beekeeping through her landlady. It seemed a natural fit for Roberta to start her own hives when she returned to the states.

As a foreign language teacher with Summers off, and a growing family to support, Roberta's passion for honey bees developed into a collection of bee yards totaling approximately 125 hives. She was what is called a "Sideliner" which is between a hobbyist and a commercial beekeeper. The name Indian Fields Apiary was chosen to honor a local town flooded by the building of a reservoir for the city of Albany.

Roberta's beekeeping practice was a mix of observation informed by biology, as well as a genuine affinity and respect for her bees. She adapted her management style to fit her limited time and limited brawn, arranging her beeyards in a U-shaped configuration, and positioning a snowmobile trailer in the middle to minimize hefting. She had a gentle beekeeping philosophy, and worked her hives without gloves. "It's always less work when you do things the bees' way," Roberta explains. "You can try to fight it, but they will win every time."

Honey sales augmented her salary, selling via newspaper advertisements and while participating in local fairs and festivals. The whole family was involved in these proud days of winning ribbons and awards for honey and baking. Carol Glatz, the youngest of the children, reminisces about the annual Hunter Mountain German Alps Festival where Roberta had a large screened structure built to accommodate a small hive for live bee demonstrations throughout the day. Roberta would dress in a traditional Bavarian dirndl with Carol in a little sundress, as a way to challenge and disarm people's paranoia in the era of the 1970s killer bee movies. The presentation would often include Roberta placing a drone in Carol's mouth to the astonishment of the onlookers, and then Carol would open her mouth to let it fly away.

Expanding her knowledge and influence

Early on, Roberta was in a world dominated by men at local bee club meetings, until the 1970s brought a shift in caring for the land, and women became more active in beekeeping. Roberta tells of the first time she went to a bee club meeting in the 1960s and was pleasantly surprised to find quite a few women in attendance. After a time, she became aware that all the women had left the room. A male beekeeper approached, towering over her small frame, and informed her that the "ladies had adjourned down the hall." She got her muster up, and blurted out "I'm no lady, I'm a beekeeper."

Roberta became a regular at local, state, national and international meetings, where she gleaned tips from commercial beekeepers happy to explain away to the attentive, disarming, female beekeeper. She was always hungry for the academic presentations where she gathered the scientific knowledge she had craved since her youth.

Carol, 11 years younger than her next sibling, became her mother's regular companion, attending her first bee club meeting in Puerto Rico in 1966 on her mother's hip when only a few months old, and her first Apimondia in 1967. Roberta took all four children to the Moscow Apimondia in 1971, and continued to travel with Carol to most Apimondia meetings she has attended throughout the world, including Warsaw, Munich, Beijing, Budapest, and Australia.

Facility with languages opens many doors in life. Roberta is fluent in German and Spanish, as well as competent in Russian. She can navigate basic "beekeeping" talk in Chinese and Italian too, and I swear she also speaks "Bee."

Roberta's language skills, and her intrepid spirit, were invaluable on these worldwide, international beekeeping journeys. She always planned on staying in each country for the apiary tours that took place both before and after the main congress events. Roberta was fascinated by the different hive styles they came across and the charm of the beekeepers. She often has been better at translating bee talk than the translators assigned to each tour. The joy bubbling up from her retelling the stories of these journeys is contagious. She has been asked to present an overview of her Apimondia travels this coming Spring to inspire beekeepers in advance of the Montreal Apimondia in September, 2019.

Academic Work and Associations

Under Roger A. Morse, at Cornell, Roberta completed the first Master Beekeeper certification class in 1978. This accomplishment was enormously satisfying to Roberta and cemented a working relationship that lasted until Morse's death.

In the early 1990s, Morse called on Roberta to assist in research following a growing concern over proper pumpkin pollination in New York State. This involved working in the trenches in the field, which was an absolute delight for Roberta who found herself thoroughly in her element. She collected every different kind of bug she could find in the pumpkin fields and sent them back to Morse. It became clear that the Eastern Squash Bee Peponapis Pruinosa was the prime pollinator of these Cucurbit, with the female bees specific to this pollen alone.

Researcher Roberta in a pumpkin field.

Morse treated her like a grad student and she received the title Cornell University Visiting Fellow.

Roberta dug into her work and became a specialist in the nesting and mating of these solitary bees. She became a part of a larger team from North and South America advancing the understanding of the habits and historical distribution of this specialized bee.

Roberta was a contributor to the comprehensive publication Pumpkin Production Guide (Ithaca, 2003). Her knowledge and insights into this field continue to be called upon for both conferences and as a valuable resource for grad students. She has provided a ballast for some students in finding direction for their research.

Throughout her beekeeping career Roberta has been actively involved in beekeeping organizations. In 1978, Roberta became an officer of the Empire State Honey Producers Association, and served as its President in 1982. Roberta has been a longtime member of the International Bee Research Association, Apimondia, the Eastern Apiculture Society, the Entomological Society of America, and the American Beekeeping Federation, along with local NY groups such as the Southern Adirondack Beekeepers Association, the Catskill Mountain Beekeepers Club, and an honorary member of the Ulster County Beekeepers Association.

In 1999, Roberta was honored with the New York State Beekeeper of the Year award.

New York's beekeeper of the year award, 1999.

Her Home and Extended Family

Roberta's rambling house fits her personality. The "Cold House" is the unheated part that once housed her bee operation, and is where Roberta's extensive library is stored. Her daughter Carol talks about the "ballroom" and the delightful collection of stuff to investigate.

Roberta spends hours reading, and then reads some more. Sometimes during the long Winter months she passes the time quilting. During the warm seasons, she scoots around in her VW Golf from bee meetings to presentations. Ever ready, like a well-prepared Girl Scout, for the next adventure with pollinators. She still likes to canoe on the Hudson River with her son, and row across the small pond on her property to get some fresh air. Her extremely practical side never lets her take on more than she can handle.

Over time, Roberta becomes like a family member to be cherished, always eager to share good stories and thin-mint cookies. Her wisdom and charm always ripe and ready, and the insights she offers the rest of us are genuine. Roberta is a respected elder in the beekeeping community having watched the likes of Thomas Seeley and Dennis vanEngelsdorp mature into their fullness. For many years, the story was that she was planning on adopting vanEngelsdorp to keep him in the United States due to his Canadian citizenship.

When asked what has guided her lifetime of devotion to honey bees Roberta said, "It is a whole civilization in a box, that you can have in your backyard, and it is still a mystery to the rest of us."

Roberta Glatz is a jewel of enthusiasm, experience and dedication, with longevity in the mix. BC

Grai St. Clair Rice is a New York City based writer and beekeeper with HoneybeeLives. She co-teaches some of the classes and presents talks to the public and beekeepers.

BIGGER PICTURE

Jessica **Louque**

Granite City Produce – Jessie Thomas

As a hobby beekeeper, one of the bee goals is to be able to sell your own honey. Sometimes, it's to your friends and family, or at your own market, or at your booth at a larger market. Some beekeepers want to be able to sell to restaurants or small stores, or have dreams of making it to larger production. For this Interview Edition of *Bee Culture*, I decided to speak with the manager of a local produce store that I've visited for years. Surprisingly enough, there are very few of those in the area. This is one of the areas that has actually gotten a little smaller as time goes on instead of larger. Here in Mount Airy, most of the economy ran on textiles and families relied on their production jobs. The manufacturers slowly shut down or moved out, and by the early 2000s, a lot of the city that was thriving was now looking for new employment and had lost a lot of the customers that supported local small businesses.

It's also hard to compete with the big box stores because you have to charge more to your customers or you can't afford to be open. However, that higher cost can be worth it to find what you want.

Back in September, I went on my yearly expedition to find my prized Magna Bonum apples that are so scarce and only available for a few weeks each year. I usually have to go all the way into Virginia to find a store that sells them, but the closest one seems to be run by people that are better suited away from customers. I ended up at Granite City Produce, which usually has my apples but a little bit later in the season, and remembered that they have such a pretty display of honey for sale. This prompted my idea for the interview.

As a quick side note here (as "quick" as any of my side stories ever are), I originally intended to interview two different produce stands, as there are two that I frequent. However, after numerous attempts to contact the first place with no response, I went in and asked to talk to the owner. I explained that I was trying to write an article for a bee magazine and wanted to interview him about his produce sales and honey experience. He promptly told me he wasn't interested and asked me to leave. I'm not sure if it's the blue hair or the tattoos or the distrust of media that some people have, but he was not having it. When I stopped at Granite City Produce to ask, they were much more excited about the prospects. I learned immediately that the manager had a son who was a part-time firefighter for the National Wildlife Service and spent a lot of his summer fighting wildfires in California. When he called home, it wasn't to say he was okay – it was to ask his mom how his bees were. She was definitely familiar with the bee craze that takes over new beekeepers (and old beekeepers) since he had only been keeping bees for less than two years. The only unfortunate thing here was that the manager's name was Jessie, which was going to make it a little harder to distinguish if I did this as a normal interview article. As for you readers, I am not in the habit of referring to myself in the third person so it might not be too terribly confusing, but I also wrote this in a more descriptive fashion to avoid issues.

Jessie at the counter.

Although I had been visiting this place for most of my life, Jessie told me that they had owned the store for only about two and a half years. She manages the store and runs it with three other employees. The owners run Horton's Produce out of Hillsville, Virginia and distribute across the country besides filling orders for the store. The goal is obviously to offer what sells the best, but Jessie has the capacity to either buy on the spot or request new produce if demand calls for it. They try to sell produce that is as local as possible for most of the year but have to expand during the winter months to keep stock.

As local produce comes into season, they bring it in as it becomes available and make sure to label the origin. As the name implies, the primary sales come from produce. There is a large section of candy, but it's not the typical kind that you would find in a grocery store. These are the old-school horehound sticks, cherry drops, coconut flags, and orange slices that are your grandpa's favorite candy. There's also a display of buckwheat flour and similar products to make your own buckwheat pancakes (this display could use some nice buckwheat honey, I think). There's also cured ham or other processed meat that,

Honey display.

for example, if you bought a couple bushels of green beans or turnip greens you'd use to cook those down and give them flavor.

Jessie said they can't do much with cold-stored foods like eggs or meat because it is a much harder process with health inspections and keeping up to code. They've only had one inspection since she's been in charge and they came out of it on top (no small feat when dealing with inspectors!). I did expect to see more home baked goods, but Jessie explained to me that it was the same situation as the cold goods in that the kitchens had to be state inspected so Aunt Sally down the road couldn't just bring in her pies to sell – unless it was a certified kitchen. They have one lady that makes fried pies that has an inspected kitchen, but it's just too hard for normal people to get their household kitchen up to code or deal with the hassle.

On top of the food produce, flowers and pumpkins and other decorations set out in abundance at Granite City Produce. During this time of year, mums reign supreme in burgundy, orange, and yellow. I will say that I absolutely hate mums. They are my least favorite flower of all flowers because the smell reminds me of funeral homes (you'd think that would be a rose smell, but roses don't quite smell "dead" enough). I had a months-long fight with my mother over having a fall wedding and not decorating with mums. She completely ignored that I didn't like mums through all of our conversations and kept talking about buying them or just decorating in "certain places" with them until I finally told her I would stop in the middle of the ceremony and we would throw them over the pond like a clay pigeon and shoot them out of the sky.

Once she realized I was serious about that threat, we didn't have any more mum discussions. It seems that I am in an incredibly small minority, as most people love mums.

Jessie explained that they order the colors that sell the best, and that if they order other colors, usually they just will not sell so it's not worth the waste of truck space to get them delivered. Their produce stand is not an incredibly large place, so products are specifically targeted towards what sells best with little room for "try-outs."

I asked Jessie if they did poinsettias in the Winter, but she said they were not worth the hassle so they didn't sell them at all. In the meantime, pumpkins fuel the Fall decorating sales, with all shapes and colors and sizes piled high on pallets across the parking lot and spilling into the view of anyone driving down the highway in eye-catching displays. There's also corn stalks and Indian corn for sale for extra decoration.

The obvious companion to pumpkins and corn and mums would be the apple displays. There's not a lot that beats the smell of fresh apples spilling out of baskets and waiting to be taken home. Jessie has a lot of say in the types of apples that they can sell, but Honey Crisp is always a big seller, and they do well with heirloom varieties that you can't find in a grocery store. After all, my search for bizarre apples are the reason I visit in the Fall. I have to convince them to carry Summer Banana apples in the future to add to my odd apple list.

The Fall colors outside make a very attractive picture for a place to stop and buy farm fresh groceries. I picked up a tomato during my conversation with Jessie and made a tomato sandwich out of it that was absolutely delicious (I'm pretty sure I bought a Brandywine but it might have been a Beefsteak).

Now, if you walk in the main opening past all the produce, you'll see a wall to your left that is filled with shelves of honey that are backlit to draw attention to the honey hues. Some of the honey is a more commercial variety that is packaged

Pumpkin display at Granite City Produce.

in a nearby city, while others are from local beekeepers.

Jessie was actually requesting more honey to sell, saying that they are always looking to buy and they can offer on the spot and buy it basically however it's packaged, as long as it has the proper labeling on it. Everybody take a moment to give a nod to Dr. Ambrose and check out the Truth in Labeling for honey in NC and you should be able to figure out all the necessities to inform the buyer about your honey.

Jessie hasn't been able to get as much honey as she would like to sell, and as they prefer to sell local products, she was interested in finding new beekeepers to assist with this. I know a lot of hobby beekeepers would love to meet someone who says "please bring me honey to sell" and give them all of their honey for the season. We will definitely be meeting up with Jessie to help her out with this, and also spreading the word around to the local beekeepers to add to the queue as well. This is the ideal place to sell honey because the overall theme of Granite City Produce is to sell as local as possible, which encourages the idea of buying local honey and supporting local beekeepers. BC

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

Beeyard Thoughts, Observations, and Updates

Some People Who Were At Pivotal Points On My Beekeeping Journey

It's not about me – I promise

Editor Kim has told me that this annual issue in which selected beekeepers are interviewed is the most popular issue of the year. I've always found interviews to be a challenging topic for an article. Who to interview, what to say, how to say it, how to photograph the person, and most of all – how not to be boring. Having written that, all of the interview articles in previous BC editions have always been upbeat, positive, interesting and educational. *(But that still doesn't make it any easier for me.)*

My contribution to this month's topic is not about me, but I must be a player in this piece. I want to tell you about the various people who helped get me to this point in my beekeeping life. I certainly needed help. This year is my 45th beekeeping birthday. That's a long time, but others have been involved in this craft much longer. I'm no record breaker.

For me to get this point, it took a series of junctures in life – decisions that I made without a road map of life. While my beekeeping passion was all mine, the people who happened to be at those junctures were unintentional guides who gave me directions and support but who rarely gave specific advice. They gave me foundational information. Most of them are no longer here.

My earliest contributors to my bee life

The very earliest contributors to my bee life were school teachers. *Mrs. Harvel*[1], second grade, used an aquarium to show how a tadpole changed into a frog. Ultimately, the young frog grew legs and jumped out the schoolroom window. *Mrs. Griffin*, sixth grade, had my class sprout grains of corn in soil-filled cups that were kept in the dark *"ink closet,"* a closet where we actually stored our ink bottles[2]. The corn sprouted white – not green. When we later put the corn on the window sill, it turned green. This simple project clearly showed the actions of chlorophyll and photosynthesis. I was enthralled. *Mrs. Crocket* was my eighth grade science teacher. She was the first to begin to bring scientific concepts together. She introduced basic theories in geology, astronomy, and biology. In several ways, I've always felt that my life's path began in this class. In high school *Miss Smitherman* taught me advanced biology and human biology – including human reproduction. Very enlightening and a class not to be forgotten.

I was not a particularly strong academic student, but I loved anything biology or science-related. When I left home to continue my education, I knew – clearly – that I wanted to major in Biology. While away at Troy University, I married a young woman from my eighth grade science class. She knew someone who knew someone who could help me get a job within the university. For $1.15 per hour for 15 hours per week, I became an aide assigned to the entomology instructor, *Dr. Costes*. I immediately took her introductory entomology class and began developing an interest in entomology. It was a thorough and demanding class. Working with insect collections, grading exams, and working as a lab instructor, Dr. Costes developed me into a competent basic entomologist. She was patient and supportive. Under her tutelage, I developed a strong bug love. Strangely, during this time, I had no special interest in honey bees.

Immediately after university graduation, I did some military time and upon my departure from active service, the G.I. Bill was available to me. In a very real way, this support program paved my road straight to beekeeping. I certainly didn't know it at the time.

Using G.I. Bill funding, I went to graduate school at Auburn University in the Department of Entomology, expecting to become a pesticide specialist. At the time, that's where the money was.

Dr. George H. Blake, Jr.

At Auburn, *Dr. George Blake*, Professor of Entomology became the gateway to my career. For reasons that many of you may know from a story that I have often told, I essentially accidentally signed up for his beekeeping class. It's a bit of a story that is out of place here. At the time, bees had little to do with my chosen pesticide career. You see, I never intended to stay in this odd class.

Due to World War II, Dr. Blake's earliest years at Auburn University (Then named the Alabama Polytechnic Institute, API) are cloudy – at least to me. University policies and programs were being changed due to the war. For instance, the university changed from the semester system to the quarter system to help male students graduate quicker before going into military service.

Blake trained at Fort Benning, Georgia as a forward artillery observer and then trained his own artillery battery. For his distinguished service in France

[1]I am using the title designations for my teachers as they were at the time. That was their name to me during those years.
[2]It's true. We actually wrote with refillable fountain pens.

Dr. George Blake

and Germany during World War II, Blake was awarded several honors, including the Bronze Star and two Purple Hearts. I took two of Dr. Blake's classes and spent hours in labs with him. Though Vietnam was raging at the time I was at Auburn, he never mentioned his own significant military contribution. In my presence, he never showed preference or exceptional interest to military veterans in his class. I suspect that most of his students learned of his war-time contribution from his obituary.

In late 1948, the year of my birth, Blake attended the University of Illinois where he received his doctorate in economic entomology before again returning to Auburn. George H. Blake Jr. died in 1997.

He was a powerful personality in the classroom and everywhere else, I suspect. He was loud, engaging, entertaining, and very educational. He was casual and academically confident. Those hundreds of us who took his classes continue to have a unique bond – a sense of unwarranted acclaim. *We were one of Blake's students.*

Some distinct memories

During my time with Dr. Blake, I acquired several long-term memories that I cherish. For instance, on the several occasions when the bee class installed packages, the good Doctor would select a student, instruct him or her on how to bounce the wooden cage, remove the queen cage and then, *"pour the bees from the package like shelled corn."* You must know that every time, I have shaken bees from the packages of my lifetime, I remember that reference. Indeed, it is like pouring shelled corn from that screened cage.

The timeframe was the early 1970s. The first time I ever attended a bee class with the Doctor was ironically a lab session. He had put a carbide-tipped circular saw blade on the bee lab table saw to cut deeps down to deep shallows (6-5/8"). Noise, sawdust, sparks and occasional nails were flying about the lab area as he shouted, *"these deeps have gotten too heavy for me so I'm cutting them down to a lighter box size."* Across the room sat a stack of 20 or 30 packages of bees.

The place was chaotic. Most of the students were traditional hippy types of the day. They sported bandanas, long braided hair, sandals and all were wanting natural honey to go with their unflavored yogurt and raw bean sprouts. I had a thought something like, *"this is the craziest crowd I've ever been around."* Shortly thereafter, we installed the packages, and I never looked back. Indeed, that lab day was my life's last day of normality. I no longer ran from bees, but rather I ran to bees. That's just not normal.

A brief dead end with a thank you

I was passionate about beekeeping. I could not get enough. I have no idea what causes such devotion in people. At the end of the day – honey bees are simply insects. But not to bee people.

On a trip home and after experiencing my bee energy time and again, my Dad asked me a legitimate question. *"Jimmy, how are you going to make a living with your hobby?"* While his comment *"stung,"* I knew he was right. My wife was working to support us while I had only erratic part-time income. Where is this going? I needed a plan.

On a whim, I went to visit *M.C. Berry* of M.C. Berry and Sons bees. The Montgomery-based company produced packages and queens. Sitting across the heavy, dark desk from him in a paneled room with the requisite bee and hive things sitting here and there, I told Mr. Berry I wanted to work for him. I explained my passion for bees and that I needed to begin to generate income. At the time, my only background was a partial bee class at Auburn.

Mr. Berry, a man whose face I cannot even recall, told me to finish the bee class and complete my Master's degree. Then come back to him and we would talk. When I left that day, that was my intent. You probably know I never went back.

I will always appreciate whatever Mr. Berry saw in me that day that caused him to politely send me away. Maybe it was a good vision or maybe it was a bad one. Either way, he steered me into a life that was better suited for me. I never thanked him for that experience. In fact, I never saw him again. The company no longer exists.

Uncle Auby

My Dad was part of a large depression era family. Of the many uncles and aunts that I had, *Uncle Auby* stood out. While serving in the U.S. Army Air Corps in WWII in India, Uncle Auby contracted polio. The VA trained him to be a watch and clock repairman. To this day, I have a

Dr. Blake's out apiary building and beehives (1973). The huge forestry building with expansive parking lots is there now. All bee facility remnants are long demolished.

A 45-year-old super end from one of my first beehives. Note my uncle's frame brand used to brand the super.

My uncle, Auby Tew, during WWII years. In later years, he got me my first two hives.

jewelers lathe and a few of his other repair tools. At the time, he lived in Micanopy, Florida. I don't know how or why but he had bees there. As you would expect, he was "kinda" nutty about them.

While I was an irrational bee student at Auburn, at a family event, I mentioned to my Uncle that I was ready for some bees of my own. My memory fogs until I can recall two beehives in the open trunk of a Rambler American[3] at my childhood home in south Alabama. The two hives were off loaded at our family farm and put in one of the worst locations on the farm. To access the colonies – once we got them there – required crossing a six foot deep ditch with a steep side and fence line at the top. It was a terrible location. I have no recall of why I selected it. None the less, thanks to Uncle Auby, I had my own two hives of bees. All these years later, I still have a few pieces of my original hive equipment.

A distinct memory Uncle Auby gave me

Due to his watch and clock repair training, my Uncle was a crazy man for precision. He flatly stated that the eyelet holes in the end bars of frames were not centered enough. When I worked with him, he required me to use a tri-square, lay out a dead straight line and re-drill the eyelet holes. This task drove me crazy. At the time, the eyelets were made of brass not aluminum as they are now *(for those precious few of you beekeepers who still wire your frames)*. He also required gluing and nailing the frame every way possible. I do wish I still had one of his indestructible frames. Alas . . .

Dr. Dewey Caron

As I was finishing my degree work at Auburn, no one was surprised that I would want to pursue the next degree. I asked Dr. Blake to take me as a student. He turned me down. He said he was in the last stages of his career and that he had long ago stopped taking students. Another professor at Auburn, Dr. Mike Williams, ironically, was on the faculty at the University of Maryland before returning to Auburn. He knew the bee professor at Maryland and thought I would fit in there. Upon his advice, I contacted *Dr. Dewey Caron* at the University of Maryland.

Dr. Caron accepted me as one of his students. I entered the program in the Entomology Department at Maryland and was trained in all academic aspects by

Dr. Dewey Caron, NJ Beekeepers Association Annual Honey Show, February 12. Curtis Crowell photo

A partial view of Dr. Caron's classroom at the University of Maryland, 1975.

my mentor. He taught me beekeeping, he taught me to present structured lectures and discussions, he taught me how to creatively develop training programs and short courses, and how to organize classes. Dr. Caron is the professor and teacher who took me to the final stage of my journey.

I must readily say that my training program with Dr. Caron is not over. We are now both – mostly – retired, but my mentor simply will not quit. Even in deep retirement, Dr. Caron continues to develop impressive written material and to present current and authoritative lectures. It feels more than a bit wrong for me to quit while my mentor is still working essentially full time and working very productively. On my life's bee path, I owe Dr. Caron a lot.

This is risky

I have taken a great risk in listing people who have been influential. Where is the line. People such as Laurence Cutts, former state apiarist, Florida and commercial beekeeper were instrumental in my beekeeping career. So many good people to squeeze into 2000 words here. I appreciate all of them.

You, too

Each of you who have read to this point have similar people in your life who helped you on your individual way. They may have only been doing their job, but they helped build your road to beekeeping.

Thanks to all the people in my life who helped me get to this point in my beekeeping journey. Each of these people have meant a lot to me. BC

[3]To my Alabama readers, no need to phone the bee police. When my Uncle brought bee hives to me, we had no idea that Alabama had a "no comb entry" regulation. It's still in effect today. Mr. Guy Carr, Alabama State Apiarist at the time, inspected and approved the colonies. He suggested that I acknowledge the regulation from henceforth. I have done that.

Dr. James E. Tew, State Specialist, Beekeeping, The Alabama Cooperative Extension System, Auburn University, Emeritus Faculty, Entomology, The Ohio State University; ***Tewbee2@gmail.com; http://www.onetew.com***

CALENDAR

♦ARIZONA♦

The American Bee Research Conference (the annual conference of the AAPA) will be held in conjunction with **The American Honey Producers Association Conference** at the DoubleTree by Hilton in Tempe, 2100 South Priest Drive, January 9-12 .

For information **www.americanhoneyproducers.org**.

♦INDIANA♦

Indiana Bee School XVII will be February 23 at Decatur Central High School, 5251 Kentucky Avenue, Indianapolis. Registration begins at 7:00 a.m. and program starts at 8:30 a.m.

Speakers are JTom Seeley and Jeff Pettis. Sessions for beginners and advanced. Over 30 vendors. Pre-registration is $35/member and $45/non-member including lunch.

For information and to register visit h**ttp://indianabeekeeper**.com or contact Mike Seib, 317.432.5342 or beekeeper.indiana@yahoo.com.

♦LOUISIANA♦

Louisiana Beekeepers Association will hold its 57th Annual Convention at the West-Cal Events Center, 401 Arena Road, Sulphur, December 6-8.

Speakers include Randy Oliver, Juliana Rangel, Pierre Lau and others.

For information and to register visit **www.labeekeepers.org** or contact Jennifer Brown, 601.493.3447.

♦MISSOURI♦

Eastern Missouri Beekeepers will hold their annual workshops and banquet in St. Louis, February 8-9, 2019 at Moritz in Fenton. Tuition for the workshop is $85/person by January 20. After January 21 is is $95/person.

Speakers include Kim Flottum, Andony Melathopoulos, Stephen Pernal, Becky Masterman and Ana Heck. There are courses for beginners and advanced. Lunch and refreshments are included as well as course materials, handouts, a reference book and catalogs.

For information and to register visit **www.easternmobeekeepers.com**. Or contact info@easternmobeekeepers.com or 314.669.1828.

♦NEW YORK♦

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

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

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

♦SOUTH CAROLINA♦

The american Beekeeping Federation Conference and Tradeshow ill be held January 8-12 at the Sheraton Myrtle Beach Convention Center Hotel in Myrtle Beach.

For details and to register please visit **www.abfnet.org**.

♦TENNESSEE♦

Honey Convention March 21-23 at Fountainhead College of Technology, 3203 Tazewell Pike, Knoxville.

For more information and to register visit **www.honeyconvention.com**.

♦TEXAS♦

Austin Area Beekeepers Association will hold their seminar February 2 at the Austin Marriott North, 2600 La Frontera Blvd., Round Rock. The cost is $70.

All experience levels are welcome. Over 35 presentations will be offered.

For more information email **ance@beekeepinghelp.com**. Register at https://aabaseminar2019.eventbrite.com

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Just down the road from Colby Farm, I caught up with veteran Colorado beekeeper Paul Limbach at his honey house. He was just back from a fishing trip to Canada and Alaska. After he regaled me with tales of his Far North adventures, I coaxed him into talking about his life with honey bees.

Paul, so you were born into beekeeping . . .

I was born in 1947 in a little one room house in Grand Valley, Colorado, which is now Parachute. My dad started working for John Holzberlein in 1946. John was a very famous beekeeper at the time. He was president of the [American Beekeeping] Federation. He was the first guy from Colorado to go to California to raise nucs and queens. He did that clear back in the 40s and 50s.

My dad had 400 or 500 hives most of his life, and I helped him build up to 1100, which I purchased in 1976. And now we're up to somewhere in the neighborhood of 2500.

Did you have bigger honey harvests in the old days?

Absolutely. My dad retired with a 120-pound average. We got our honey from alfalfa just like we do now, but back in those days they cut with horses, or a tractor and a sickle mower, and it took 'em a long time. If you had a big ranch, by the time you had the first cutting up, the second cutting was starting to bloom on the other end. So you almost always had something blooming, alfalfa-wise.

There was a lot more sweet clover back then, and I blame the county weed spray programs that eliminated it along the highways and roadsides, and then they started spraying the ditch banks, too. Sweet clover's pretty easy to kill. There was white sweet clover and yellow sweet clover, and that's all basically disappeared now. The alfalfa's still there but they don't raise seed from it anymore because there's too many deer. The deer eat all the seeds.

What's your average honey yield today?

Average since I took over the business is a little under 50 pounds. The high was 100. Of course we have a lot more bees now. If you only have four or five hundred hives you can put a lot more energy into each hive than you can with 2500.

What did you major in at Colorado State University?

Entomology. I looked for something I could do other then keep bees, and I couldn't ever find it.

I heard you were a ski bum for awhile.

When my dad ran the business, I wasn't busy in the winter, and the first few years I was out of college I worked up in Aspen for about five years. I worked for a ski lodge that had about 30 guests. I cleaned rooms, and we got done about noon every day. We could ski the rest of the day.

Did you ever quit beekeeping?

No, I've done it my whole life. I've kept bees in Texas and California, and I worked bees in Australia for one Winter. In Australia all the honey came from eucalyptus. There's something like 600 species of eucalyptus trees, and something was always in bloom. That guy's bees were spread out for miles and miles. That was in 1972 or 1973, and he was much more mechanized than most of the beekeepers in the U.S. at the time. He had a Bobcat forklift, a semi, and 1000 hives.

How long were you president of the Colorado State Beekeepers Association?

I don't remember, but I was president or vice-president longer than probably anybody else.

What were the big issues back then?

Pesticides. That was back when Penncap M and Furadan were big problems. Beekeepers used to get taxed by the state, and that was a big issue back then, too.

How did University of Minnesota bee researcher and MacArthur fellow Marla Spivak come to work for you?

I've ended up having several people who are in research work for me. Bob Cox worked for me for a lot of years. He worked at the Weslaco bee lab for a long time. Marla, I met her when I went down to learn to inseminate queens from Steve Tabor at the University of Arizona. That was in the early seventies.

Marla was one of the students who helped teach me insemination. Marla had a friend named Abby who also taught me, and both Marla and Abby worked for me for a year or two after that. They wanted to come to Colorado.

Tell us about your business today.

Our business today is kind of unique because we're also the only business that has a permit to put bees on the National Forest. We run bees in the high country [on the Flat Tops.]

We're really spread out, and we drive 150 miles to work some of our bees. Some of it's dry-land alfalfa, and for some reason there's not many insects bothering the alfalfa. Some of it's in the CRP (Conservation Reserve Program), so once it starts blooming,

Ed **Colby**

Meet Paul Limbach

it blooms until it gets too dry. They can't harvest it if it's in the CRP.

You have bees all over northwestern Colorado.

Right – Rifle, Silt, Meeker, Craig, Hayden, and then on the Flat Tops. We have some other bees in the high country on private in-holdings, too, up towards Trappers Lake.

And you send your bees to California to pollinate the almonds.

Yeah, Lyle Johnston got us started. Lyle was the first beekeeper in Colorado to take bees to California, or at least the Johnston family was the first to take bees to California [for pollination]. I think we started back around 1995.

Before that, we left them in permanent locations. I almost never moved bees, until I started running them up on the [National] Forest. I started on the Forest just as I got out of college. I think I've had that permit since 1972 or 1973.

Were you the first person to do that?

Yes, back then it was easy. Now it's tough. I got grandfathered in.

So you have a wife, Nanci, who runs a wildlife rehabilitation facility, and she does a lot of work rescuing bears. And I know you spend a lot of time keeping them out of your bee yards. How's that work out between you two? Do you argue about bears when you take your fall trips?

(Laughs) Well, I don't believe any of her bears have gotten into a bee yard once she released them. They get a tag when she lets them go. I can't blame her for any of my problems. There's just so many bears these days.

My father was in business 30 years, and he had one bear get in his bees.

To what do you attribute the resurgence of bears?

In the old days they had a Spring bear hunt, and they also allowed people to hunt bears with dogs. In the Spring, the bears were coming out of their dens, and people knew where they were. One of the good things about Colorado is that the state provides beekeepers with [solar powered electric] fences. We're very lucky that way.

We maintain about 75 fences. That alone is a tremendous amount of work.

You told us how old you are. We know you like to fish. What are your retirement plans?

(Laughs) Well, I'm just going to keep keeping bees as long as I'm physically able. I've enjoyed the heck out of it. I feel like I'm one of the luckiest people in the world, because I enjoy my job immensely.

Work 'til you drop, huh?

Yeah, I'm hoping these young guys working for me are going to start taking over more of the business, because I'm physically not going to be able to do it too much longer.

My wife Nanci would like to see this place put in some kind of a conservation reserve type system where it preserves the beekeeping and her wildlife rehab center. That's pretty complicated, but she's got a lady that wants to keep it going, and [Paul's manager] Derrick wants to keep the bees going, so between them we're hoping something like that could work out.

As October evening shadows lengthened, our interview ended. I didn't want to keep Paul any longer. He had to pack. He was leaving in the morning for Montana – to go fishing.

Happy Holidays From the Hive!

Twas the end of the December, when all through the hive,
Not a Bee was foraging, nor doing the jive;
The honeycomb were filled with pollen and care,
In hopes that spring flowers soon would be there.
All the worker bees were clustering all snug in their skeps,
While visions of nectar danced in their heads;
And Mama bee's kingdom and her one drone - poor sap,
Had just settled down for a long winter's nap.
When out in the bee yard there arose such a clatter,
I awoke from a dream to see what was the matter;
Away to the window I flew like a flash,
Tore open the curtains and knocked over my cosmos seedling stash.
The moon on the breast of the new-fallen snow,
Gave the lustre of mid-day to my lovingly wrapped beehives below;
Then, what to my salivating proboscis should appear,
But a miniature sleigh, carrying Tallgrass mead beer.
With a hipster driver, dancing rhythmically and quick,
I knew in a moment it must be Karl von Frischnick?
More quickly than an evolutionary timeline they came,
And he whistled, and waggled, and shouted his peers by name;
"Now, Langstroth! now, Doolittle! now, Miller and Alley!
On, Morgan Freeman! on Dzierzon! on, Eva Crane and Warré!
To their guarded hive entrance! to the clustered pollen ball!
Now buzz away! buzz away! buzz away all!"
To all the inspiring nature defenders of Two Thousand and Eighteen,
Wishing you honey revelry and a bountiful harvest scene;
And whether your apiary activities are far or near,
HAPPY HOLIDAYS TO ALL, AND A HAPPY NEW YEAR!
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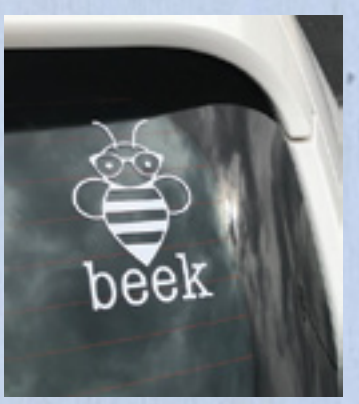

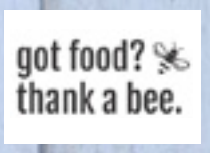

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16 oz - $23.99/50 ct. Case
32 oz - $39.99/50 ct. Case
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8 oz Panel Bears $144.95/525 ct. Case No Caps
12 oz Panel Bears $114.95/400 ct. Case No Caps
16 oz Panel Bears $94.69/240 ct. Case No Caps
24 oz Panel Bears $89.50/195 ct. Case No Caps

CLASSIC GLASS JARS

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32 oz - $12.95/12 ct. Case

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