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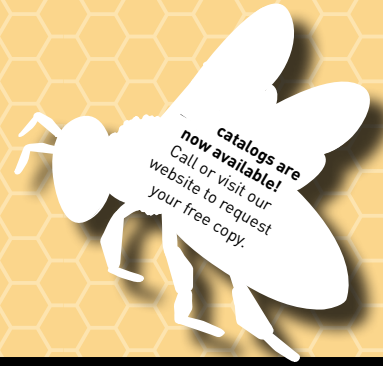
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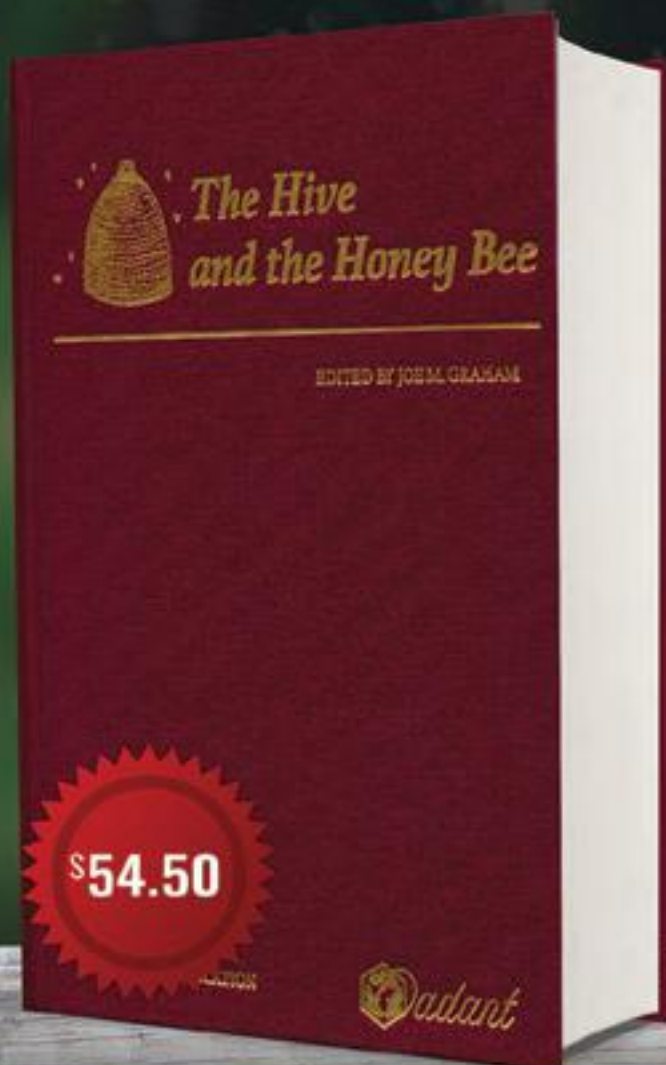
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*How do drones get to be drones?
See page 41.*

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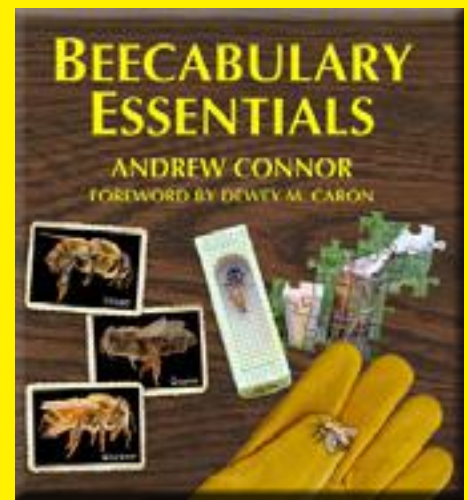
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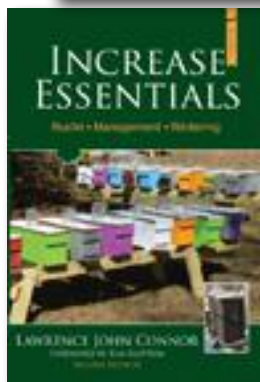
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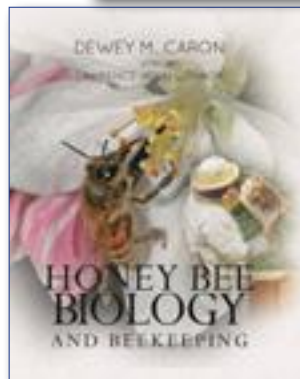
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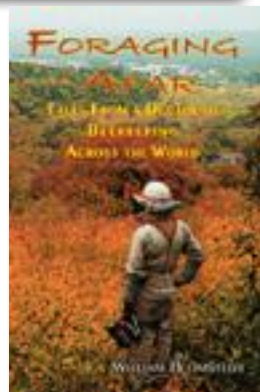
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A Positive Vote

I love the new format of *Bee Culture* and enjoyed reading the articles more than any issue I can remember. If nothing else, your definition of "buttload" was worth the price of admission. Thanks for the info and entertainment.

John McEntire
Holden Beach, NC

Practicality

While I highly respect and thoroughly enjoy reading Tom Seeley's works on the honey bee, I actually cheered a little after reading Ed Colby's Bottom Board in the December issue. I agree that there is much to be learned from studying bees in nature. We should pursue as much of this knowledge as possible. But, the bottom line is, we must also be able to fund our efforts with honey bees or find another pursuit.

That's one of the reasons that I speak to new beekeepers about taking what works and leaving the rest, whether it's from academic

studies or practical business applications. Those who make a living and feed their families through husbandry of honey bees have a ton to teach us. After all, if it doesn't work, they lose money and go out of business. Besides, we've all heard that all bee keeping is local. What works in one area/ climate may not do so well in others. That concept extends to the beekeeper. What satisfies the needs of one beekeeper may well not fill the requirements of the next. Bee yard practicality that allows the honey bees to thrive and to pay their rent is what satisfies my beekeeping requirements.

This is why I subscribe to this fine magazine, lots of practical stuff.

Greg Carey
MD

Happy Subscriber

I'm so happy I subscribed to *Bee Culture*. And thank you so much for sending the December issue!!! It opened right to the

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article about Sarah Red-Laird/ Bee Girl. Bee Girl is one of three conservancies to which I/BeeStill donate. After reading this article, I'm more inspired than ever: thank you!!

All peace and blessings to you and yours.

Joan Fox
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The Bee Informed Partnership, BIP, has been at the forefront of actively organizing and leading in practical honey bee management creation and sharing since CCD raised its ugly head. And, for the yearly Survey (that I hope you are participating in) that is the benchmark for health and vitality of US Beekeeping. Dr. Dennis vanEnglesdorp created and led BIP and Karen Rennich administered it exquisitely for years. Times change, the industry has evolved, and Dennis and Karen decided that it's time to make a change and let others structure BIP to support beekeepers into the future. The new Executive Director of BIP is Annette (Net) Meredith. She has a Great background and excitement for this new role in BIP. Let's visit with the BIP Executive Director, Jerry



Q) Before we get into the really interesting things about you and BIP I want to share with our readers that we are visiting over the phone. And my screen is telling me that I am talking to you in Colorado. I thought BIP was housed at the University of Maryland (UMD)?

A) I live and work in Ft. Collins, Colorado, which is a beautiful place. BIP's staff is spread across North America in Canada, the United States and Mexico so many of us work remotely and take advantage of video conferencing.

Q) I have known about BIP (Bee Informed Partnership) since its inception by Dennis (Dr. Dennis vanEnglesdorp) and seen its growth over the years with the leadership of Dennis and Karen Rennich and the great BIP Tech Transfer Teams and Lab assembled to be the 'go to' trusted organization for Honey Bee industry information. This is a prestigious job! How did you find out about it?

A) I was looking online on a nonprofits job postings site and saw the BIP announcement. It was exciting for me from the beginning because my background is in bees and pollination on farms and most of my jobs have been in the nonprofit and public sectors. I did graduate work at the University of Maryland, so when I saw the job posting I was familiar with the work coming out of there on bees in recent years but I had already graduated when Dennis and Karen arrived with the Bee Lab so we did not overlap.

Q) This is kind of serendipity. What was your connection to UMD? Did you grow up on the East Coast?

A) Yes I did. I grew up in Maryland north of Baltimore near the Pennsylvania border and the Chesapeake Bay. When I was growing up it was a lot more rural than it is now. It was a wonderful place to grow up. Weekends and Summers I would go out and explore the woods and streams. I loved playing outside, catching my own contender for the 4th of July frog-jumping contests and enjoying building my insect collection for a school project. My parents' only rule was to come back home at supper time but otherwise we could run around outside all day. It was a wonderful way to spend my childhood years.

Comment, Jerry – I had kind of similar parents 'back in the day'. I would go out and catch turtles, fall in the pond, and climb trees and just sit for hours up in them it

seemed. We had lots of Pine Trees, and I remember my Mom telling me at one point when I was 12-13 yrs old when she would go outside, she would simply look up in the trees to see which one I was in and how high up I had climbed. Hoping I could get down.

Q) Looking at your life journey that you have taken, with the unexpected twists and turns that life challenges you with and how you grew up with those positive environmental influences what did you do in High School that prepared you for College and bees?

A) I loved high school. I loved school in general. I was a true bookworm. I'm not sure I knew what I wanted to do when I grew up but I knew I loved learning. In high school I played the violin in the orchestra. Our public schools offered field hockey and lacrosse and I enjoyed being on these teams throughout high school. I went to college at the University of Michigan and at the time I was really interested in evolution and evolutionary genetics and received my bachelors in anthropology. After college I moved to Colorado and then moved back east for a number of years due to a family illness and during that time received my masters in Sustainable Development and Conservation Biology and doctorate in Environmental Science studying pollinators, both from the University of Maryland. In 2014 I moved to Colorado again. I played club lacrosse in college and afterward and so now one of my favorite activities out here is coaching youth girls. It's a growing sport in Colorado so it's really fun to be involved. I used to do a lot of distance running and triathlons but wear and tear over the years has caught up with me so have been cutting down the distances more recently but still enter some smaller races here locally.

Q) So, you were intrigued about the BIP, its goals and direction and

From The Editor — **BIP'S NEW EXECUTIVE DIRECTOR**

the potential to be in a leadership position? How did you meet Dennis and Karen?

A) I was invited to an initial video interview with Karen and some members of BIP's Board. Then later I was brought in for an on-site interview for several hours and I really enjoyed that because I was able to meet more staff members and ask a lot of questions. I learned a ton about BIP's programs and they asked me really interesting questions. Everyone was very open in sharing information and it was very interactive.

Q) Now you are Executive Director of BIP. Which I think means that you work with BIP Staff, the Board of Directors, Beekeepers, and other external people and entities (stakeholders) who care about Honey Bee Health. No pressure there. Congratulations!

You and I first met in person at the ABF meeting this past January. What a busy meeting. Were you able to set aside time to meet with Tech Transfer Teams?

A) ABF was really great because I was able to talk to many attendees about what they wanted and expected from BIP. And, I was able to meet with most of the BIP staff. What a terrific group of motivated individuals. They are all passionate and have great senses of humor, which I love.

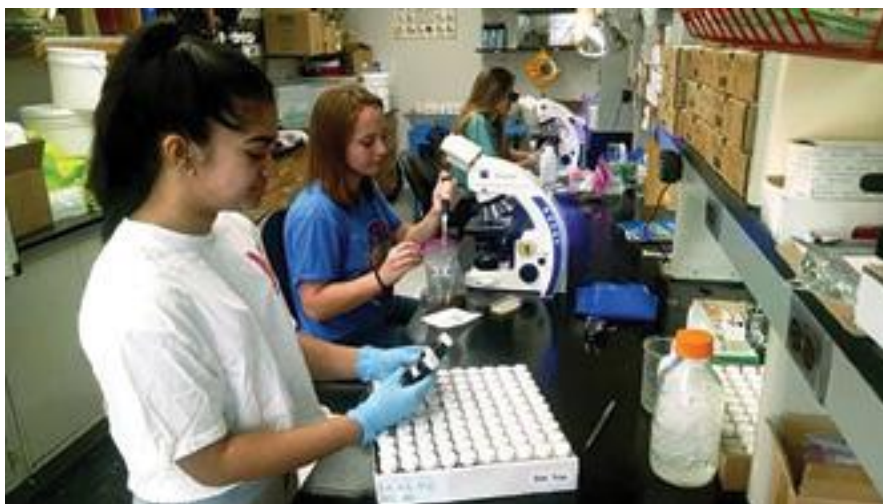
Q) This is 2020 and BIP has made this journey in the Beekeeping world from scratch to reshape how the industry can be approached. It may be too early for you to draw a firm direction but as you and BIP move forward what are the goals?

A) BIP was incubated out of the University of Maryland Bee Lab and has since become its own non-profit. As with most non-profits, BIP is continuing to evolve and as part of that growth comes a time to undergo a strategic planning process to evaluate where the organization should be headed in the next five to 10 years. Over the next year, BIP's Board, staff and external stakeholders will review BIP's mission to ensure that the services that BIP provides are aligned with what beekeepers of all sizes need as the state of beekeeping changes



over time. The Tech Transfer Teams, the Sentinel Apiary Program, the Management and Loss Survey, the individual trials and case studies – all of these services combine to make BIP

an important player in the bee world and we want to continually improve as an effective nonprofit. I'm excited to be part of this process. **BC**



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It's Summers Time -

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Well in the minds of almost 1,000 beekeepers it's officially Spring in Northeast Ohio. *Bee Culture* staff attended the Tri-County Spring Conference in Wooster, Ohio March 7. Just like clockwork it always happens on the first Saturday in March - always. Some years it's a little tricky with the weather, but this year it was a beautiful day - very cold, but no snow.

Michael Palmer was the keynote speaker and from what I heard he was a hit. I never actually got to speak to him the whole day. That's how it goes sometimes. *Bee Culture's* new editor, Jerry Hayes was on the program for two talks. This was his first Tri-County in several years.

The *Bee Culture* team did well. We sold lots of books, lots of subscriptions and got to talk to lots of friends - many that we only see once a year at this meeting. A huge thank you to Jean and Amanda for all of their hard work. We sure couldn't do this without the two of them. People were standing in line before Amanda could even put her bag down.

It's such a good day in Wooster. All of the big bee supply companies are there and folks are just excited about getting their stuff and getting ready for the bees. There are always a lot of beginners and that's fun to watch them and talk to them. Just an all around

great day. Mark your calendars for next year - the first Saturday in March. We'll see you there.



The Spieth Road poultry are all ready for Spring also. All six ducks made it through Winter and we haven't lost any hens lately. Although we have one that spends a cold night out every now and then because she keeps getting out of the pen and then doesn't come home at night. She's an Americauna and one of the youngest group, about one year right now.

We were in DC the middle of February and she spent five of the coldest nights we've had all Winter outside. Our good friend, Fran, takes care of the birds when we're gone and she looked for her everyday and couldn't find her.



The day we got home about 4:00 in the afternoon, we walked out to take a look and there she was just sitting up on the deck. So somehow she found a good spot at night to hunker down and made it through just fine. A couple of those nights were single digit nights.

It's become an unhappy trend over the last few months reporting the loss of dear friends. Kim and I and the Root Company lost a dear one in February. Her name was Sue and she was my first boss back in 1988. At that time the Root Company had its own print shop and that's what Susie did - she printed all of our office forms, the company newsletter and probably millions of honey labels and candle labels during the years she worked here. After leaving the Root Company when we did away with the print shop, she had her own print business for awhile and then drove a school bus for several years.

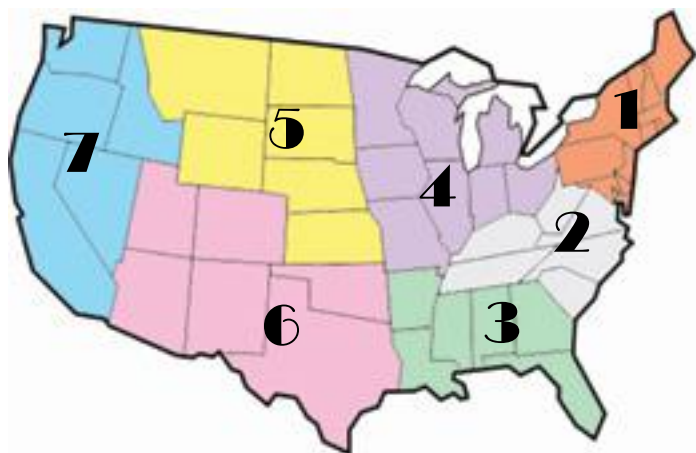
Sue was one of those absolutely delightful people - seemed always happy and always ready to help however she could. Over the years we became dear friends. The last couple of years she spent fighting cancer, so we didn't see much of each other, but managed to meet for lunch as often as we could. Sue was devoted to Kim and me. She was always so happy to see us. That's how she was - she just made you feel like you were so special.

I know as we get older it's just part of the deal that you start losing people, but that doesn't make it any easier when you lose one of life's real treasures. Thank you Susie for being in my life. I will miss you a lot.

Enjoy the Spring! Summer is coming and hopefully it will be a good beekeeping year for all of us.

Charly Summers

APRIL - REGIONAL HONEY PRICE REPORT



We asked our reporters what they did last Summer/Fall to get their bees ready for what has turned to be a long, cold, wet Winter in most places. Here's a summary of their management actions and some results so far.

26% did not feed their bees anything last Fall. 30% fed both protein and carbs, .01% protein only and 41% fed carbs only.

What about mite control (we asked about measuring mites). 37% said they sampled for mites and 44% said they didn't. 15% did not apply

anything for mite control, while 80% applied some form of mite control.

And what about moving them only a short distance to a better/safer/easier to get to location? 76% didn't move them at all, but 18% actually did move them somewhere better.

And moving them further, to a warmer climate? .03% did move them, to places like Georgia, California or to lower elevations in several places.

Buildings are becoming important to some for wintering, 89% of

our reporters haven't explored that option yet however, but .03% are moving in that direction, using underground bunkers, storage sheds and the like.

Winter protection of any kind? 69% don't use any, but 25% do use some. What kind? Pre-made wraps from bee suppliers, regular tar paper, black plastic, heavy duty foam insulation of several types, bee cozies are popular, roofing felt paper, and plastic cardboard wraps.

As of the first week in March, a quarter of our reporters hadn't

been able to inspect their bees yet, but based on previous experience, or actual inspections, 26% thought they were doing better than they expected, 49% were right where they thought they should be, 12% however were doing worse than expected, with some arguing it was a tougher Winter than expected.

Those that said they didn't sample for mites were the ones reporting a worse Winter survival – how about that.

REPORTING REGIONS								SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	\$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	1.98	2.19	2.20	2.21	2.48	1.83	2.40	1.40-3.35	2.17	2.17	2.22	2.22
55 Gal. Drum, Ambr	1.97	2.11	2.06	2.07	1.83	1.73	2.20	1.30-2.55	2.02	2.02	2.17	2.09
60# Light (retail)	239.38	186.80	196.67	174.44	158.00	201.33	228.70	145.00-325.00	204.23	3.40	195.57	207.88
60# Amber (retail)	236.67	189.83	192.50	161.92	220.60	192.50	204.13	150.00-325.00	203.69	3.39	200.24	208.31
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	98.59	75.85	111.20	79.80	82.21	108.96	108.96	57.60-194.40	91.93	7.66	88.67	85.54
1# 24/case	149.17	108.15	127.58	108.63	129.33	113.40	136.20	72.00-300.00	131.62	5.48	134.58	132.11
2# 12/case	130.05	96.16	120.27	115.92	114.42	96.00	189.50	72.00-265.00	124.58	5.19	118.61	121.26
12.oz. Plas. 24/cs	103.01	101.58	88.67	93.80	89.88	97.20	108.80	66.00-172.80	99.09	5.50	99.85	98.61
5# 6/case	147.40	110.96	145.50	104.62	113.16	105.00	144.45	71.50-240.00	133.14	4.44	133.40	131.27
Quarts 12/case	148.15	150.82	118.92	152.40	141.02	152.94	144.00	96.00-228.00	143.36	3.98	158.12	154.14
Pints 12/case	98.98	98.24	70.67	83.56	96.00	94.00	90.00	65.00-140.00	90.17	5.01	91.49	89.35
RETAIL SHELF PRICES												
1/2#	5.71	5.07	4.89	4.53	4.42	1.89	5.26	1.89-9.00	5.08	10.17	5.18	4.97
12 oz. Plastic	7.23	5.98	6.39	5.57	5.25	5.82	6.20	3.72-10.00	6.19	8.26	6.17	5.91
1# Glass/Plastic	9.44	7.75	8.94	6.51	7.61	6.51	8.60	4.79-17.00	8.20	8.20	8.14	7.90
2# Glass/Plastic	15.53	13.97	15.27	10.36	12.55	12.50	14.50	8.39-25.00	14.21	7.11	13.89	13.58
Pint	13.79	10.93	10.75	9.83	11.25	10.88	9.70	6.00-20.00	11.05	7.37	10.75	10.94
Quart	20.70	18.75	17.21	16.53	18.38	17.40	19.06	9.25-30.00	18.28	6.09	19.18	18.41
5# Glass/Plastic	30.23	26.33	38.00	26.25	22.21	20.50	21.79	13.00-50.00	28.94	5.79	30.27	29.02
1# Cream	10.94	8.94	12.00	7.75	8.73	8.00	11.35	6.00-16.75	9.99	9.99	9.74	10.06
1# Cut Comb	12.54	13.19	13.49	12.36	13.50	12.92	15.00	6.00-20.00	12.85	12.85	13.03	11.29
Ross Round	11.01	7.39	11.21	10.75	11.21	11.00	13.75	7.00-15.60	11.11	14.82	10.84	9.83
Wholesale Wax (Lt)	8.14	4.95	5.67	5.97	6.50	4.25	10.25	3.00-15.00	6.70	-	6.88	6.52
Wholesale Wax (Dk)	6.37	4.61	4.52	5.31	5.67	2.75	15.00	2.00-15.00	5.54	-	6.00	5.39
Pollination Fee/Col.	98.00	77.50	67.50	103.00	90.00	100.73	86.67	30.00-195.00	88.97	-	97.03	94.48

NEXT MONTH

Welcome to NEXT MONTH, where our Honey Reporters share a line or two about what they will be doing NEXT month with their bees. Advice is given for each region so you can see what others are doing where you are, and, of course in all the rest of the regions. Check these out. These reporters are successful in business.

Region One

- Reverse Hive Bodies
- Do Alcohol Mite Sampling
- Treat for Mites if required
- Consider Splitting
- Feed Sugar Syrup
- Feed Pollen Sub.

Region Two

- Check Colony For Disease
- Do Alcohol Mite Sampling
- Treat For Mites If Required
- Make Splits
- Add Supers

Region Three

- Check Queen Laying
- Check for Frames of Brood
- Add Supers
- Look for SHB

Region Four

- Do Alcohol Mite Sampling
- Split Hives
- Check For Queen Cells
- Replace Failing Queens
- Swarm Prevention

Region Five

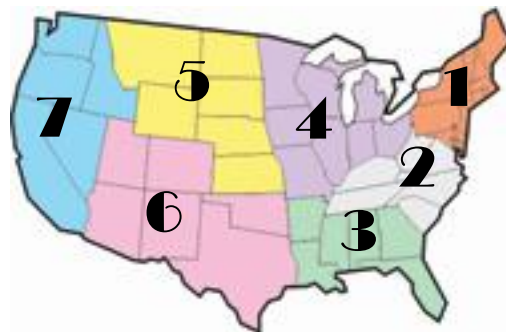
- Check if Queen is Laying
- Feed Syrup and Protein
- Reverse Hive Bodies
- Add Supers
- Swap out Old Frames

Region Six

- Do Alcohol Mite Sampling
- Feed Syrup
- Swarm Prevention
- Split

Region Seven

- Do Alcohol Mite Sampling
- Treat for Mites if Sampling Shows more than three mites per 100 bees
- Feed Syrup and Protein



More Honey Reporters Wanted

We are always expanding our Honey Reporter population and need new reporters in EVERY region. We ask that you fill in most of the wholesale or retail or both sections, most months, and our short survey on the back. We give you a FREE subscription for your service. So if you are interested send an email to Amanda@BeeCulture.com and put REPORTER in the subject line. Include name, email, phone number and mailing address and we'll get you the next Honey Report form. Sign up today and be a part of the BEST Monthly Honey Price and Beekeeping Management Report in the industry.

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BEE TALK



Send us your questions, we'll find the answers. Our regulars and our guests will share what they know. Send your questions to Jerry@BeeCulture.com, with **BEETALK** in the subject line.

Question 1

We as Beekeepers are told that reversing brood boxes is a good thing in Spring, that it helps in preventing swarming because the colony runs out of room and feels crowded. What do you think?

A. True, reversing the brood boxes in Spring provides a relief of congestion inside the hive. It is one of the ways to prevent swarming. In general this practice is common when beekeepers keep the bees in two brood boxes. After Fall feed most of the bees are confined to the bottom box for wintering. As the season progress towards Spring the colony and queen move upwards. By Spring bees and the queen will be in the top of the hive body and the queens become reluctant to move downwards to expand the egg laying. This situation will create a crowded congested nest that could lead to swarming even though there is space to expand. It is understood that It is instinct bee behaviour "Moving up Not down!!!!" The option to correct this situation is to move frames of sealed brood or honey from the top

box to the bottom box. Then take empty frames from the bottom box and place them next to the cluster to open up and expand the cluster to give more space for the queen to lay eggs and reduce congestion. The quick option is reversing the two boxes. However, the reversing of boxes must be done at appropriate time that will allow the cluster to expand gradually. Thus, it will not split the cluster into two clusters one becomes queen right and the other queenless and brood can suffer from chilling. **Medhat Nasr, Alberta**

In my opinion, reversing the brood boxes in the Spring forces the queen to move upwards into the available space more quickly than allowing her to rediscover at her own pace. This in turn can help prevent swarming, while also giving the beekeeper peace of mind of knowing where the queen is located and ensuring that she and the workers encounter the available space more quickly. In Texas, I rarely see beekeepers utilize a two brood box system. Beekeepers here typically only use one brood chamber with medium boxes on top as honey supers. If the queen is laying in the supers in the early Spring, some beekeepers will switch the boxes around. In my hives, I typically make the effort to find the queen and place her back in the bottom box if she is not already there rather than switch the boxes around. I primarily do this because I'd rather have the queen laying in the deep box and not in my honey

supers and I don't want to have to switch boxes back around at a later date. **Mary Reed, TX**

In January/February here in Georgia, we start hive reversals. This method won't necessarily keep a colony from swarming, but it will buy you some time while giving the colony empty comb to rear more bees. But only reverse the super(s) if there is no brood in the lower boxes. If the brood area is spanning both boxes, doing a hive reversal will separate the cluster. The colony will have difficulty keeping two brood areas warm and brood can become chilled and die. Also, if the upper box above the cluster is void of honey, you may need to feed sugar syrup. **Jennifer Berry, GA**

Follow up

What do honey bees do in a vertical hollow tree cavity? Doesn't the queen just make the loop and find space below where she was?

The bee cluster in hollow tree moves freely on the combs. The cluster expands naturally as temperature rise and food sources become available. There is no disruptions in the growth and if the nest becomes crowded, the bees will swarm. Beekeepers who keep bees in a single box all year around manage the bees more or less like bees in hollow trees with some exceptions. Beekeepers in this case move empty combs around and organize them in a way to open the cluster, provide more space for the queen to lay eggs and reduce



congestion. They also use a queen excluder on the top of the brood box. Then, they add an empty honey super to relieve the congestion and reduce the swarming tendency. **Med-hat Nasr, Alberta**

I imagine that in a feral hive the queen will eventually move back down the comb for brood production, possibly influenced partially by the worker bees as they rediscover the available space. She may also be influenced by the rate of honey production and pollen collection by the bees, forcing the queen to look elsewhere in the hive for a space to lay her eggs. The benefit of a beekeeper being able to manipulate a hive is that he/she can also manipulate colony behavior. Switching boxes around could encourage earlier, faster growth of the managed colony in comparison to that of a feral colony. **Mary Reed, TX**



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Number 1 Tip of the Month – Tray for Small Hive Beetle Traps



I like to use the small hive beetle trap that hangs between the frames. You fill it with oil and it's reusable and works well. I fill it before going in the beeyard because of wearing gloves. Every time I would set one down it would turn over and spill and make a mess. I solved that problem. Take a piece of 2x2 and cut out some notches in it just wide enough to hold the traps snugly. No more spilling. *Michael Brotzge, Monticello, KY*



From the 2013 January *Bee Culture*, this gargoye cut idea is found in a letter to the Editor on page 48 and made so much sense to me that I have started implementing it on the right-hand top corner of all my boxes. The writer called it a gargoye cut. The gargoye cut is designed to allow the hive tool to easily slip between the hive bodies without doing any damage to the finish or wood. It also acts as a gargoye (hence the name), allowing any moisture to readily drain from this junction during rainstorms, preventing early decay of the wood. This has done exactly what it's advertised to do, extend the life of the boxes by reducing the wear on the corners. I can bevel the corner edge with a sander in less than a minute and then repaint/finish it. A lefty will want to hit the left corner. *submitted by Greg Carey, MD*

Bee Culture wants you to share your good ideas with our readers. Be precise and include a photo or sketch if possible, but that may not be necessary. If we use your idea you get a free one-year subscription. The best each month gets \$100.

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New Hive Butler Tank



What's the messiest part of harvesting honey? Uncapping, of course. Well, retire your bucket and your bus tubs – have no fear – The Hive Butler Uncapping Tank is here to make uncapping cleaner, easier and more fun!

Made from the original Hive Butler totes, the Uncapping Tank is ready to go the minute it arrives. Complete with two, modified Hive Butler totes, a solid lid, food-grade/BPA-free sieve, honey-gate and frame rest with stainless steel screw, the HB Uncapping Tank is ready to make your uncapping chores easier from beginning to end!

The nifty frame-holding design of the Hive Butler allows you to hold up to 10 frames at a time, waiting for extraction. Any honey drainage is caught in the bottom tote, to be bottled up later. No mess. No fuss. The Uncapping Tank is also big enough to allow two people to uncap at once, to keep the process moving along.

If you need to interrupt your process for whatever reason, or you've finished your extraction you can snap on the solid lid, and feel confident that your honey frames will stay clean and safe until your return. Again, the mess is contained.

After straining is done, bottle up your additional honey and carry the Hive Butler Uncapping Tank full of wet frames to the yard for the bees to clean up. You can also clean the sieve by putting it in the freezer and snapping all the cappings off of it – or simply by setting the whole tote with sieve out for the bees to work through the cappings.

The BIG BONUS? While both Hive Butler totes have been modified to create the Uncapping Tank, the bottom tote only has a gate installed in it. It can still be used throughout the year, as a traditional Hive Butler, in the beeyard, making splits, protecting queens, or collecting swarms. It has even been suggested that the gate provides a terrific bee entrance should you choose to add some drawn comb frames and the lid – to make weather worthy swarm trap.

All HB components are food-grade, BPA-free. The totes, lid and sieve are produced in the United States. Order online at www.thehivebutler.com.

Congrats On New Locations –



Our new store is tucked away in some of the most beautiful lake country Ohio has, Tappan and Clendingen are both within about five minutes, both are great for fish and water activists, we are two doors down from some of the best homemade ice cream in Ohio and have a great offering of locally made wood-ware, quality beekeeping accessories and honey products. Deersville is open Tuesday and Thursday 12-6, Saturday 8-12 and we host a Share, Learn Grow session on the first Saturday of the month from 10-11. This is a free gathering of beekeepers discussing that month's beekeeping activities in an awesome environment.



Locations are
 Newest – 225 East Main St Deersville, Ohio 44693 330-401-5889
 9679 Trail Bottom Rd NW Dundee, Oh 44624 330-987-3680
 9096 Bell Rd Adamsville, Oh 43802 740-630-5609
 TMK 33874 St Rt 643 New Bedford, Oh 43824 330-897-8650



Vass, N.C. – Midnight Bee Supply Co., a local producer and supplier of a full line of beekeeping equipment, announced that a grand opening celebration will be held on Saturday, April 8, from 9 a.m. to 5 p.m. for its Moore County store, located at 120 E. Maple St., Vass, N.C. 28394. The event is open to the public.

The store will officially open at 9 a.m., followed by the ribbon-cutting ceremony at 10:30 a.m. and a barbecue lunch at noon. Beginning at 2 p.m., James Creek Cider House will be on hand to serve samples of its premium craft ciders. The family-friendly festivities will also include games, hourly giveaways, facility tours and honey bee swarm demonstrations.

Midnight Bee Supply has been operating since 2010, when founder Calvin Terry began selling beekeeping products out of his parents' garage. Over the past seven years, Terry's company has become known for its commitment to locally sourcing and producing its low cost, high value products, resulting in steady growth to its customer base.

"I'm excited to bring the busi-

ness out of the garage and into the retail world," said Terry. "The new store offers all levels of beekeepers a bigger and better shopping experience, along with the support and guidance of our knowledgeable staff. We're all looking forward to the grand opening party, which promises to be not only a significant day in our company's history, but also a great day of fun for the whole community."

About Midnight Bee Supply Co. Midnight Bee Supply provides equipment and services for every type of beekeeper, from novice to master. Because each employee is an active member of the beekeeping community, customers can count on the staff for expert advice, hands-on learning and ongoing support. Midnight Bee Supply sells a variety of products including queens, NUCs, 10- and 8-frame equipment, and extracting equipment. The company is also known for its woodenware, made from the finest cypress and pine logs. To learn more, visit <https://midnightbeesupply.com> or <https://www.facebook.com/Midnight-Bee-Supply-Co-254925278021904/>.

FOUND IN TRANSLATION

Modified Bacteria To Contain Varroa.

Jay Evans, USDA Beltsville Bee Lab



When it comes to microbes in honey bee colonies, the bad guys get all the press. Since Aristotle there have been countless discussions of foul scourges, blights, and paralyzing viruses that afflict bees. More benign microbes have received far less attention, if they were noticed at all. This is no longer the case. While there continue to be advances in understanding honey bee pests and pathogens, the real frontier for over a decade has involved bacteria and fungi that do not appear on bee health alerts, and are rarely mentioned in beekeeping meetings or books. Work on these 'other' bee microbes gained some footing thanks to the careful description of hundreds of microbial isolates by Dr. Martha Gilliam with the USDA in Tucson, Arizona.

Dr. Gilliam was especially active in the 1970's and 1980's and, while her job also required her to study the diseases of the time, her real passion was for the many unsung microbes in honey bee nutrition. Her work, some of which is detailed at https://www.researchgate.net/scientific-contributions/73309614_Martha_Gilliam, echoes that of a birder or botanist collecting samples throughout the Amazon. Her passion was to grow any and all of the bee-associated and flower-associated microbes in Petri dishes in a sterile laboratory. She isolated hundreds of types of microbes, carefully documenting where each was found, possible impacts on bees or bee products, and the overall diversity of microbial communities.

Along with dissecting thousands of bees and flowers, this work used dozens of nutrient recipes and conditions to nurse microbes to grow, followed by many hours of microscopy and chemical tests aimed at putting a name on isolated microbes.

After Gilliam's work there was a bit of a lull in the study of microbes in the hive until the enigmatic Colony Collapse Disorder in late 2006. Suddenly, everything was a suspect again, since the usual suspects were not noticeably associated with all the fuss and disorder. Consequently, there was renewed interest in scouting the full microbial world for causes of bee illness.

Fortunately, Professor Nancy Moran, also in Tucson at the time but at the University of Arizona, was lured into this fray. Moran had carried out many years of critical work on microbes tied to aphids and other insects and came to the bee fold with new insights and great passion. In the past decade, she and her students and colleagues have made game-changing advances in the understanding of bacteria tied to the honey bee digestive tract (Google Scholar is one place to start to see some of her work on the microbes of bees and other insects, or you can check out her Lab Page at her new home, the University of Texas, <http://web.biosci.utexas.edu/moran/index.html>).

Collectively, they have named almost all of the key bacteria in the bee gut, tapping into bee science for names, including 'Gilliamella,' 'Frischella,' and 'Snodgrassella,' as nods to previous researchers. More importantly, they have carried out fundamental work implicating bacteria in everything from nutrition to pest resistance. These bacteria have their own lives and need not be helpful for bee health, but in fact most of them seem to have a net positive effect on their bee hosts.

Moran's group has also shown how human actions, from antibiotics to pesticides, can impact gut microbes and the bees that rely on them. They

have also greatly energized the field of bee probiotics, an evolving topic I attempted to review here in 2017 (<https://www.bee-culture.com/found-in-translation-2/>).

In a technical breakthrough just this month, Moran and colleagues used one of these resident bacteria, *Snodgrassella alvi*, as a vessel for delivering gene products that interfere with specific bee proteins, mites, and viruses. This work, led by graduate student Sean Leonard with a team of scientists from Texas, combines the power of RNA interference, a widespread mechanism for controlling genes and pathogens, with a bold attempt to tweak the cells of *Snodgrassella* to make a novel gene product (Leonard, S.P., Powell, J.E., Perutka, J., Geng, P., Heckmann, L.C., Horak, R.D., Davies, B.W., Ellington, A.D., Barrick, J.E., Moran, N.A. (2020) Engineered symbionts activate honey bee immunity and limit pathogens, *Science*, 367 (6477), pp. 573-576. doi: 10.1126/science.aax9039).

RNA interference has been used in bees before, and researchers have added genetic parts to bee bacteria, but neither approach was as powerful for bee biology and health until they were married together.

In brief, genetically modified (GMO) *Snodgrassella* were produced in three flavors, one that knocked back a honey bee protein, one that targeted Deformed wing virus, and one that targeted snippets from 14 different genes in the *Varroa* mite. In all cases, the targets were hit and bees did better as a result. Further, the modified bacteria persisted in individual bees and social groups (all of these experiments were carried out on worker bees in the lab, not in colonies).

This paper has stirred much

discussion already on possibly using this technology to improve bee health, and this is a noble direction. Still, much remains to be resolved. How long will these GMO engineered bacteria persist in colonies? How long will it take for viruses and mites to evolve resistance? How will these modified GMO bacteria behave over the long-term, and will there be a way to reel things in if they somehow go awry? Will beekeepers and consumers of hive products be OK with this? These questions are being taken seriously by researchers, including Moran's team, and regulators. Like many scientific breakthroughs, this one might remain 'good news for lab bees' for some time before it is deployed against one or more bee challenges, if it is at all. Still, the science in this work is beautiful and some of the best in the business are working to see where this goes for bee health. **BC**



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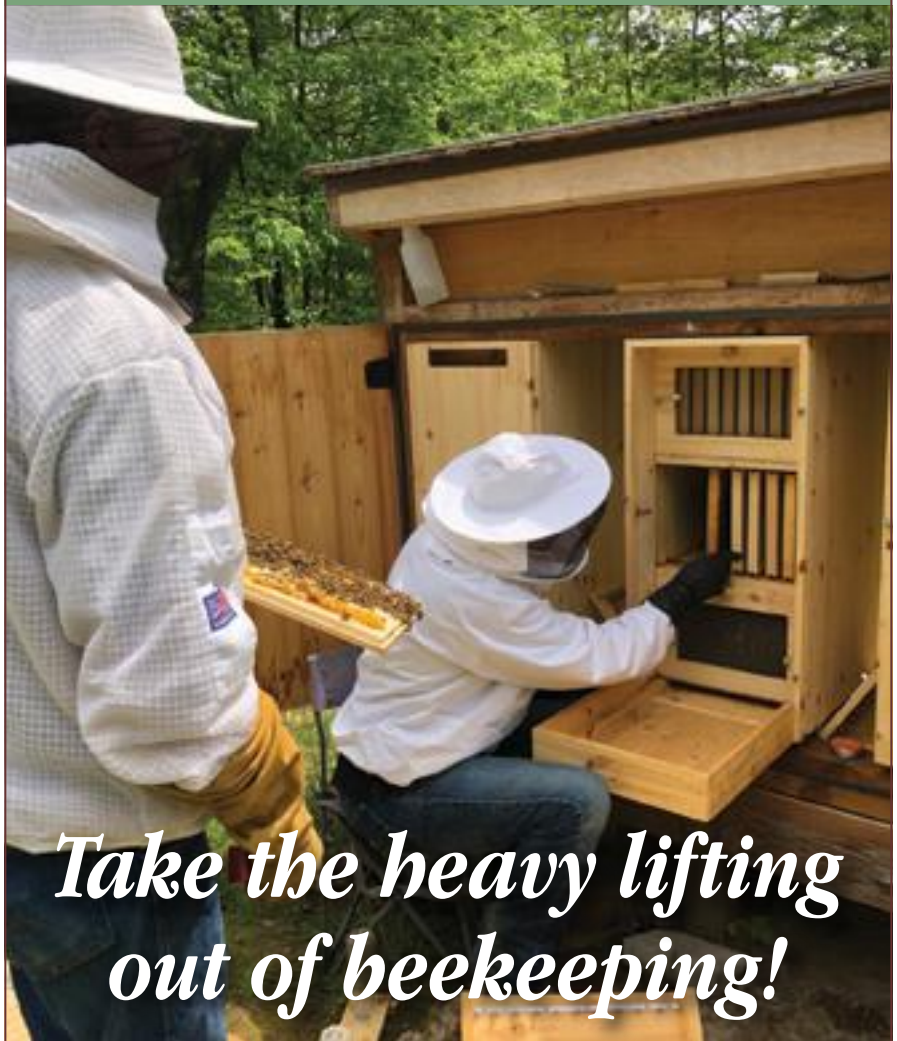
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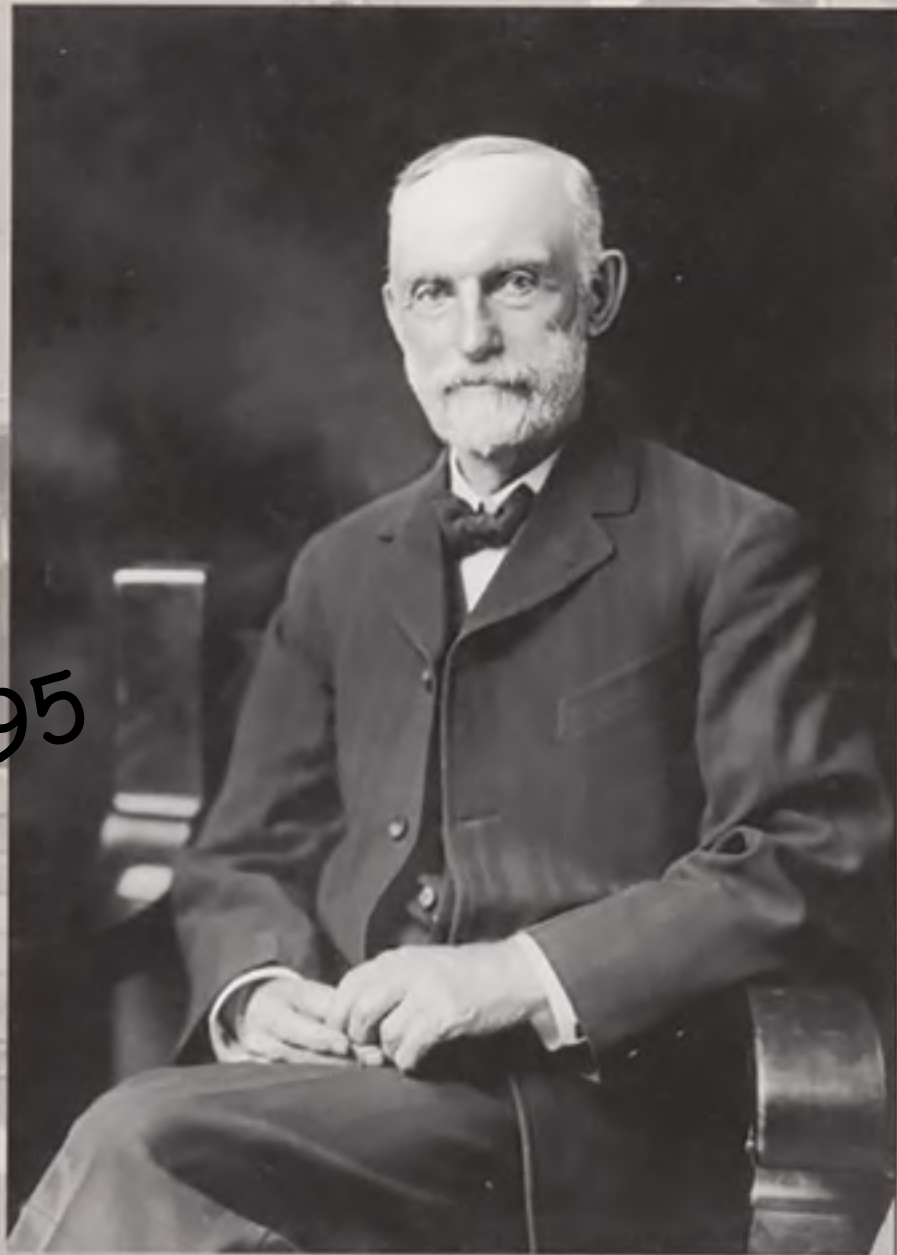
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Good Reading For Beekeepers –

The Pollinator Victory Garden. How to attract and support Bees, Beetles, Butterflies, Bats, and other Pollinators. by Kim Eierman. Published by Quarto Publishing Group USA. ISBN 9781631597503. 8.5" x 10", 160 pgs, color throughout. \$26.99.

Right off, I need to share a couple of other opinions of this work. Doug Tallamy said of this book, "A Truly comprehensive guide to improving the lot of our pollinators at home. Make a Pollinator Victory Garden and join the effort to save our most essential creatures". And then Bill McKibben added, "God knows pollinators need every edge we can give them-and this book will tell you precisely how to use your patch of land, however small, to make a real difference!"

Having these two spokespeople support a book says much about the quality of the information presented here. And then you follow up with the background Kim brings to this work. She is the founder of EcoBeneficial, and consulting and communications company, she teaches at the New York Botanical Garden, the Brook-lyn botanic garden, the Native Plant Center and the Rutgers Home Gardeners School. She has earned the reputation presented here.

So let me tell you a bit about what's in this book, and mostly about the lists of information pro-

vided here. The wealth of ideas and facts all in one place is pretty amazing.

Starting with threats to pollinators, and what to do about them. For instance, large lawns, breaks in bloom sequences, monocultures, nonnative plants, lack of nesting sites and of course pesticides. Then what are pollinators, actually like bees, beetles, butterflies, moths, flies, wasps, ants and even mosquitoes.

And where do pollinators live? I'm glad you asked. There's ground nesters, cavity nesters, tree snags, pithy stems, brush piles, and of course bee hives. And better ways to do these? Shelters, windbreaks, warming locations and more.

And native plants? Definitely important – adapted to the locality, low maintenance, provide biodiversity and soil improvement. And planting guidelines for these – both sunny and shady areas, continuous bloom, flower sizes, clump planting, similar environmental needs.

If you're not familiar with native plants in your area, now is the time to learn. Lists of when things bloom, almost everywhere except the desert SW are here, from early spring, to late fall. And of these the native flowers pollinated by native bees, honey bees, moths, beetles, flies, wasps, bats and hummingbirds

An excellent bed preparation section follows so what you plant will do well, how to care for it all season long, and more than a dozen pages of references and checklists.

Every beekeeper should be thinking like this. Kim goes a long, long way in making it possible to make it happen for you. Try this book this year.

Kim Flottum

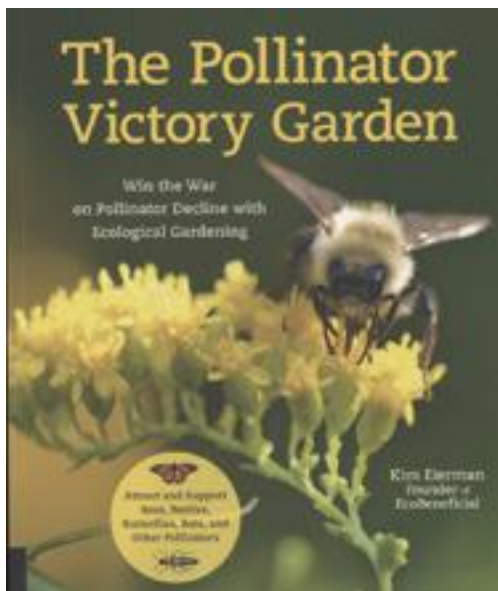
Honey Bee Drones. Specialists in the Field. By Graham Kingham. Published by Northern Bee Books. ISBN 9781912271528. 9.5" x 6.5", 82 pages. \$19.20 from www.northernbeebooks.co.uk and lots of book sellers.

It's about time somebody wrote this book. In my opinion drones are totally over-looked, mostly frowned

upon and neglected by both bees and beekeepers. I happen to have had a more than passing interest in this honey bee the whole of my beekeeping time. So thank you Graham.

And he covers the whole drone. External and internal anatomy, production and development, their role in the colony, mating behavior and biology and anatomy, congregation areas, genetics and what problems they have in the hive – think *Varroa* here – plus a huge selection of photos explaining all this, and drawings to help you understand what you are looking at. And do you know why drones are bigger than workers? Well, I'm not going to tell you, so you'll have to get the book. But I can tell you something Graham doesn't tell you. If you want to make a really big hit the next time you go to a school to talk to kids, take a drone with you. Before you leave, tie a 20' piece of thread around the section between thorax and abdomen and keep him in a shirt pocket with the end of the thread just peeking out. When it's time, slowly pull the thread out, release the drone and let him fly, on his leash. Then hand it to one of the kids. You'll be a wonder forever.

Kim Flottum



Bee Club Basics, or How To Start A Bee Club, by Charlotte Ekker Wiggins. Self Published, available from book stores. ISBN 9781080790203. 8.5" x 11", 185 pgs., soft cover, black and white. \$35.

The author has a background in management and public affairs, especially for non-profits, and uses that knowledge, and her dedication to both honey bees and beekeepers to offer some guidance in organizing a beekeeping club. It is very fundamental, but starting a club from scratch needs the basics at the beginning, not later when it's too late. This is where to start if you don't have a clue.

She starts with what is the purpose of the club, what will the structure be, and the basics of getting a club started. There are legal issues addressed here that too often get overlooked until the treasury has disappeared. But then, how formal do you want to make this....an LLC, a corporation, more, less? Answer these questions first and save yourself a lot of grief down the road is good advice.

Next, where to meet? And how much to pay, and can you afford that much every month? And what does that place need to meet what your club will need. Enough room, chairs, access to all the amenities for coffee and such, easy access, parking, and what about IT requirements?

So who's in charge? Good question. Officers – you just can't live without them, but what do they need to do to both be a good officer and be able to do the job chosen for them. So, how are they elected, anyway, and who says that's right. Figure that out right away. And how do you run a meeting, really? And here's a tough one – what about insurance? Will you need some, especially if you'll be working bees sometimes, and what about the place you meet – do they want some sort of protection from the folks they rent their rooms to? Find out.

Communication is good, good communication is hard. A newsletter, for sure, maybe. Paper or digital or both. Social media people. What about news releases and promotions for events. Gotta do 'em, but who's job? And other volunteers? Setting up, taking down, coffee and refresh-

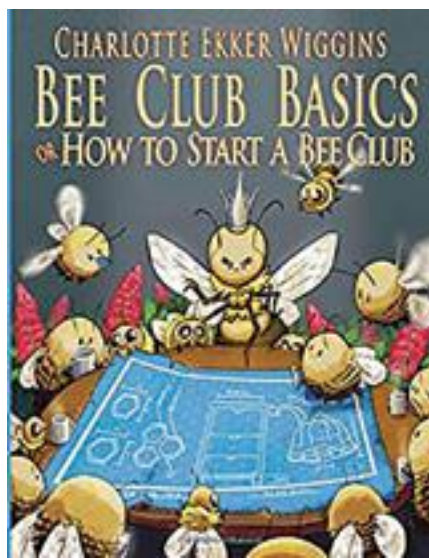
ments, program chair and what have we missed here? Getting, and keeping volunteers can be a challenge.

Programs? Money to pay for them, where to get speakers, what to do when, and planning ahead for a few months, so members know what to expect. And with that, any special events along the way? Classes and who will teach and is that person a good teacher, and organizing the swarm list and keeping it up to date is important. And how about that website for the club? Who makes that happen, all the time and up to date?

These, and more questions are addressed in this book. It's easy to use, has lots of good questions and as already stated, is incredibly basic in its organization and advice. That's OK when you're trying to figure out where to get a web page person, and how to run a meeting and where did you say the restrooms were?. But there is a ton of more advanced info in the references section that takes you to step 2, 3 and beyond in this adventure. Plus lots of charts and organizational checklists you can simply remove from the book to keep and use and pass along to the next person who thought this was a good idea.

Even if you have a club up and running this book will help it run better. And who doesn't want that, right?

Kim Flottum



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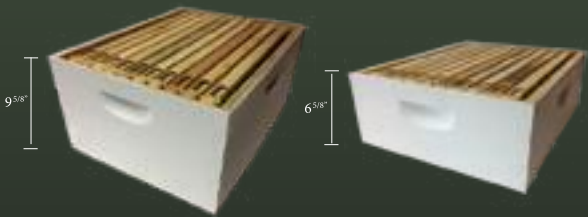
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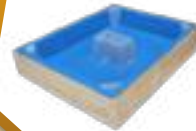


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Change comes slowly in rural Africa. Tradition is strong, any changes viewed with suspicion. I learned this well while living in an African village with the Peace Corps. So, when Winrock International accepted me as a volunteer to teach more modern beekeeping to rural farmers in Guinea, I had some idea of what I was getting into.

After flying into the sprawling maze that is Conakry, the capitol, it was a two-day trip to the little village of Nialia, where the local beekeepers awaited us.

It turned out that virtually every man in Nialia kept traditional beehives. Together they owned over 600 of them, along with a few Kenyan topbar hives (KTB's). I wondered how so many hives in such a small area made any surplus.

These beekeepers are tough. Most of their hives are large woven cylinders, maybe 4 ft long and 18" in diameter, covered with mud and grass. Almost airtight, a small hole in one end is the only opening. These hives are hung up high in trees in November. Wild swarms rapidly colonize most of them. Then, around April, the beekeepers go out at night, wearing very little clothing and no protection, and harvest. They climb the tree, lower the hive, and with the help of smoke and fire tear the hive apart and harvest everything. The unfortunate bees do what African bees do-- they abscond, leaving everything behind in search of a new home. But they are very unhappy bees, and let the harvesters know it. Traditionally, when the men return home, their wives make them a hot bath and help pull the stings out. Personally I feel these men are warriors as much as beekeepers.

As you can see, traditional beekeeping here is more "bee-having" than beekeeping. Moving from that to actual hive management is a really radical shift in both procedure and mindset, especially for very conservative farmers who live on \$1 a day.

There were a few KTB hives, but most were not managed. After all, how do you manage African bees with no bee suit? I decided the first step was teaching bee suit construction. Starting with old coveralls, tailors produced a few really decent suits which we then used to examine a few KTB hives. They were crammed full of honey! Badly crosscombed because of incorrect top bar widths, but full, and the traditional hives were also. Very encouraging, and surprising too, considering the very high hive density. They appeared very healthy, and certainly lived up to their reputation for aggressiveness (my camera lens got so much venom on it that it got a little blurry). They did have a few large hive beetles, *Oplostomus Fuliginus*. These are almost an inch long, but didn't appear to be causing any problems. The beekeepers believed that they actually help make honey.

The excessive crosscombing led to a discussion of moveable-frame beekeeping in general, which was a whole

TEACHING BEEKEEPING IN GUINEA

Working and Sharing Together

Lloyd Ziegler

new concept for them. Basic beekeeping biology seemed worth teaching also, and here the crowd was extremely interested, even incredulous. Their reaction to my detailed description of the queen's mating flight was one of the funniest moments of the whole trip.

My favorite part of the project was producing value added products: skin creams, lip balm, artisan candles, and propolis tincture. It is an easy sell, since beeswax is normally not even used. The women, who traditionally cannot keep bees, got truly exuberant over these products. In fact in every country I have taught

beekeeping, making skin creams and other beeswax products is a huge hit. Everybody got so excited about making and selling these products that they made a pact to keep it a secret from other villages, so they could monopolize the sales. People are a lot alike everywhere.

African beekeepers face difficulties we can only imagine, and probably wouldn't even think of. No money, no transportation and no electricity are only the start. Just for example,

one project objective was to set up the retail marketing of bottled honey. Well, I soon found out that you cannot buy bottles in Guinea! That's right, no bottles, except of course various used ones. A true bottleneck (sorry). Problems like that very quickly make you appreciate how many blessings we have here in America. We are surrounded by them, but so often do not even see them.

Volunteer work like this is so educational and rewarding that I can't help but highly recommend it. Personally, I made several good friends, felt like I did something truly worthwhile, and was shown once again that despite all the bad press, people all over the world are basically decent folks who just want a good life for themselves and their families. Just like us. **BC**

You can find dozens of videos about various volunteer projects by going to the YouTube channel www.youtube.com/c/LloydZiegleroklahomabeekeeping, or Googling "Lloyd Ziegler youtube beekeeping"



All The BUZZZ in...

Happy Springtime Friends,

Bee B. Queen



Bee B. Queen
Challenge

Send me a poem to
celebrate National
Poerty Month.



Swarming Bees



What is a bee swarm?

When a bee hive gets too crowded, the bees will make a new queen. The old queen bee will leave the hive with a large group of the worker bees to form a new colony.

Why do bees swarm?

In the spring, the weather warms and the flowers bloom. The queen begins laying eggs to build up the number of worker bees to collect food and build comb. More bees mean a crowded hive. So to make more room and to make more bees, over half the bees in the hive leave in a swarm to find a new home. In this way one hive becomes two.

What happens when bees swarm?

A swarm doesn't just happen one day. The bees may begin preparing to swarm weeks ahead of time. What happens when a hive is preparing to swarm.

- A new queen is made. The queen will lay eggs in a number of queen cell cups to create a new queen for the bees that stay in the hive.
- The queen goes on a diet. The queen needs to be able to fly easily when she leaves the hive in a swarm. The attendant bees feed her less and she stops laying eggs. Her abdomen begins to shrink and she loses weight.
- The swarming bees will need food for their journey. Right before they leave, the worker bees fill their honey tanks with honey to take with them. The worker bees need honey for their bodies to produce wax needed to build comb in their new home.
- The swarm leaves the hive. A cloud of bees pour out of the hive. Often the bees will cluster close to the hive while 20 - 50 scouts continue to look for a new home site. The scout bees share possible locations by dancing on the swarm cluster - the better the location, the more exciting the dance. Other scout bees may check out that location too. No one really knows how the bees make the decision on which place to go. When the decision is finally made after a few hours or sometimes days, the swarm flies off to their new home.



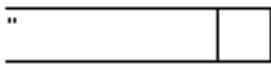
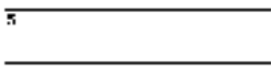
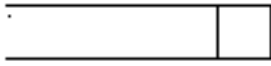
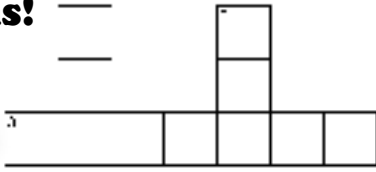
A swarm in a cable box.



A swarm on a bicycle

... Bee kid's corner

Swarms!



Down

1. The biggest swarming season is in the _____.
2. The _____ queen leaves with the swarm.

Across

3. The bees swarm when the hive becomes too _____.
4. The worker bees carry _____ to the new home.
5. The _____ bees search for a new home.
6. The _____ lays the eggs.

Produced by Kim Lehman
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1. Springtime, 2. Old, 3. Crowded, 4. Honey, 5. Scout, 6. Queen

PROBIOTICS:

Pro = For, Biotic = Life

M.E.A. McNeil

Probiotic: pro means for, biotic means life. For life. Yes, we're for life. More life, more better, right? Maybe. Maybe not.

For most of history, microbes were hidden from sight – even after Leeuwenhoek glimpsed them through his microscope 350 years ago. When, in the 1850s, Pasteur proved that germs make us sick, we learned only the harm. Penicillin was discovered seventy years later, and we armed with antibiotics. After the discovery of DNA by Watson and Crick in 1953, it was genes, we came to believe, that drove our biological destiny. Then we learned that our bodies are teeming with microorganisms – teaming is a better word. Although health is surely influenced by our genes, it could be affected even more powerfully by our microbiome – bacteria mostly, but also viruses and fungi, including a variety of yeasts. So we are less like a set of genetic instructions than a farm. And our microorganisms have their own DNA; their microorganisms have their own genes, too. In sum, they are not our guests but symbionts – partners, coconspirators, give or take some frenemies.

The importance of microbial communities in the health of animals, from humans to insects, has become recognized only recently, now that tools for studying microorganisms have become much more powerful. The arrival of DNA sequencing technology has revolutionized scrutiny of this complex and dynamic network. “We are in that beautiful, euphoric, heady, early period,” said microbiologist David Relman of Stanford University School of Medicine.

But once the news spread that we are ecosystems with legs, we ran with what little we understood to create shelves of nostrums for managing our biotic legions. And what's good for ourselves must also be good for our dogs, horses and pigs. And our bees.

All animals have biomes particular to themselves, and bees are no exception. Two probiotic products are marketed especially for bees: Super DFM, from Strong Microbials, and Pro DFM from Mann Lake. (A third product, Durvet, from PBS Animal Health, has been discontinued.) Super DFM and Pro DFM list the same eight microbes in their contents, and Pro has one additional bacterium plus

several yeasts.

What are these products? Do our bees need them? Field testing results are not available for either one, nor are there published scientific peer-reviewed papers evaluating them. How do we find out?

Entomologist Marla Spivak, at The University of Minnesota, asked a grad student in her lab to check the ingredients of these products against what is in the natural bee gut biome. There was no match, so further investigation was set aside in favor of a more promising pursuit for supporting the bee gut microbiome. To look further into these products, she said, “call Nancy.”

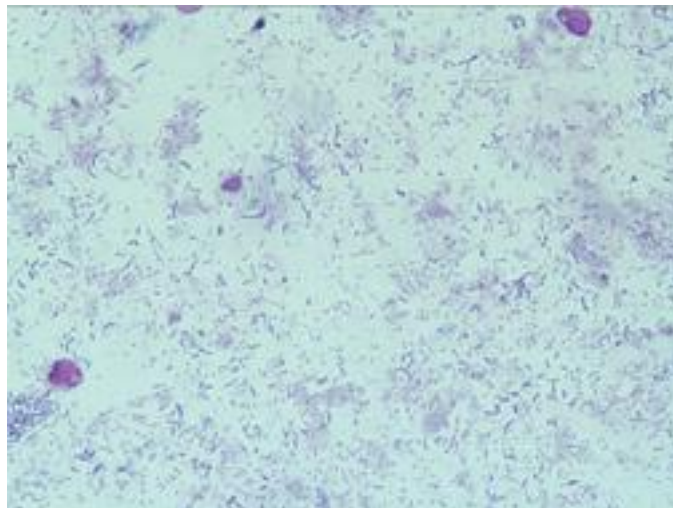
The Pioneering Researcher

Nancy Moran is the preeminent expert in insect and bacterial genomics, recognized as a member of the National Academy of Sciences and a MacArthur Fellow, co-founder of the Yale Microbial Diversity Institute and professor at the University of Texas, Austin. Her work on the symbioses in the microbiomes of insects has traced the evolution of some back 270 million years.

“We were the crazy people” for thinking symbiosis was so important, 25 years ago, she said. Her team's early work found that the honey bee gut harbors eight species of bacteria not retrieved from other environments, and that every honey bee around the world has the same set. This distinct community in the adult gut is stable but dynamic. The resident microbial species appear to have undergone such long term coevolution with honey bees that the adult gut is their sole ecological niche. Most

of the bacteria are host-restricted, that is to say absent outside adult guts, just passed from bee to bee. Of the billion bacterial cells in the gut of the honey bee adult worker, most are in the hindgut, with very small numbers in the foregut (honey stomach or crop).

The Moran lab demonstrated the vital importance of these bacteria by isolating young microbiome-free pupae before emergence and observing their resulting failures as they matured. As controls, their sisters emerged into the colony's naturally-endowed microbiome and were



A light microscope image of honey bee gut microbiota from a bee that was fed probiotics, taken by PhD student Grace Deitzler in the David Lab at Oregon State University. The photo is 63x, colored with Romanowsky staining. The small, rod-shaped purple bacteria, sometimes forming chains, are likely *Lactobacillus*, a taxa found both in the probiotic and the native bee gut. Deitzler photo.

supported in health by their acquired metabolic partners.

What does this microbiome do? “The host and the symbiont communicate in ways we don’t understand,” said Moran, and she thinks that will take a lifetime to unravel. But it is known that some strains of bacteria associated with honey bees have antimicrobial properties. Genome sequencing suggests that they also play roles in nutrition, digestion, and potential defense against pathogens.

For an example, Moran’s lab isolated 42 strains of the core bee gut symbiont *Gilliamella apicola* and sequenced their genomes. Beyond the genetic similarity in the strains, they found extensive variation related to carbohydrate metabolism. It was significant to find that some strains of *G. apicola* were found to break down carbohydrates present in the bee diet that are toxic to bees; others are able to utilize glucose, fructose, and mannose. A single strain does not fulfill all of those functions.

Should we be adding to that? Moran said that it is commonly believed that a diverse microbiota is good, but that has not been experimentally tested. In bees, species-level diversity is naturally low, while strain diversity is high. But “it is not clear that supplementing the typical bacteria already present will improve colony health. Potentially, the strains present in particular colonies have already been selected to perform well under local conditions.”

What’s in the Bag?

Nancy Moran looked at the list of bacteria in Super DFM and Pro DFM. “These are not normal bacteria in the bee gut. I don’t think they will colonize, and if they did colonize I think that’s not good. The bees encounter all kinds of bacteria, but the gut biome stays the same. The bees with altered microbiomes are mostly sick. What we want is for the bee to keep normal microbiota.”

“I can see why they [the commercial companies] chose these bacteria. To me these are standard bacteria, easy to grow. These bacteria in the products are very widespread, for example, *B. subtilis*. None of the actual bee bacteria grow under atmospheric conditions; they are anoxic (without oxygen, with one exception). For a long time, no one had cultured them because they require special culturing conditions. So these bacteria that they chose for the commercial products are grown under full oxygen, which is easy in comparison. I guess anyone can put anything in bee food.”

“Maybe some [bacteria in the commercial products] facilitate some benefit; I don’t know what that might be. I guess it’s possible, but I would be surprised to see strong positive results. The studies need to be done by scientists and other reviewers to determine if this is robust. I like to see data in a peer-reviewed journal.”

There is a field study published in *Environmental Microbiology*: Stephan et al., “Honeybee-Specific Lactic Acid Bacterium Supplements Have No Effect on American Foulbrood-Infected Honeybee Colonies,” July 18, 2019.

The Evidence in Favor

Strong Microbials opens with the claim that their product is a “Bacteria Blend for All Species of Honey Bees.” All of the species? No, surely they don’t mean all of them; they must mean only one species, *Apis mellifera*



Elina Nino, U C Davis Extension Apiarist (center) and Lab Assistant Robin Lowry (left) oversee a field test for a bee probiotic at the Harry H. Laidlaw Jr. Honey Bee Research Facility. The product was developed by a team at University of Western Ontario in Canada, including PhD candidate Brendan Daisley (foreground) who wrote the peer-reviewed paper on the initial lab work. Photo courtesy Brendan Daisley.

and all its subspecies. Just a stumble, but you wonder.

Strong Microbials does cite research papers for some of its bacterial ingredients in Super DFM. They could be stronger. For example, of the test cited to support the inclusion of *B. licheniformis*, Moran said, “It’s only a lab study; you can’t conclude it will work from that.” The research cited for *Bacillus pumilis* tests it against American Foulbrood and then excludes it from its summary of best antagonists.

A paper is cited from *The Journal of Economic Entomology* to support *Lactobacillus plantarum*. However an author of this study, Jay Evans, Research Leader at the USDA Beltsville Bee Lab, said: “Much more needs to be done with the science. How long do the probiotics persist – a day, a season? Or do they just pass through [the bees]? People are spending a lot of money without knowing what it is.” He did not dismiss the possibility of benefit, saying there is work showing some positive results for putting benign bacteria into bees. But questions remain.



Oregon State University honey bee researcher Ramesh Sagili is undertaking a field study of two probiotic products that are on the market. Photo by Lynn Ketchum, Oregon State University



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In any case, the proposed benefit for each ingredient in Super DFM is accompanied by the required disclaimer: “This statement has not been evaluated by the FDA. This product is not intended to diagnose, treat, cure, or prevent any disease.”

The logic in the market for human probiotics is that if a strain is potentially beneficial on its own, it will be that more beneficial combined with others. “That argument is fallacious, and potentially very troublesome,” said Michael Fishbach, a professor of bioengineering at Stanford. “Right now, the standard for evidence is disgustingly low.”

The second probiotic product, Pro DFM, posts that it helps improve bee colony health, positively affects nurse bees’ vitellogenin reserves, aids in fermentation and digestion of beebread and has no harmful residues. The website’s “More Information” page is down and the company has not responded to inquiry. Moran speculates that the yeasts in the formula may be intended as a nutritional supplement.

As for either product, she said, “I’m skeptical. I hate to see people waste money. I wouldn’t buy it.”

The Benefit of the Doubt

“I’ve been getting calls asking about these probiotic products,” said entomologist Ramesh Sagili, Associate Professor at Oregon State University and respected researcher. “We have done many studies on honey bee health, it is our focus,” he said. “I’m enthusiastic about honey bee nutrition, but people are selling these probiotics, and there is no proper research. There are a lot of claims. There is some anecdotal evidence, but I take it with a grain of salt. Where are the publications? I have not seen published research on these commercial products. They are bombarding people with samples. It’s very murky with these companies. There is no peer-reviewed science on commercially available probiotics [for bees].”

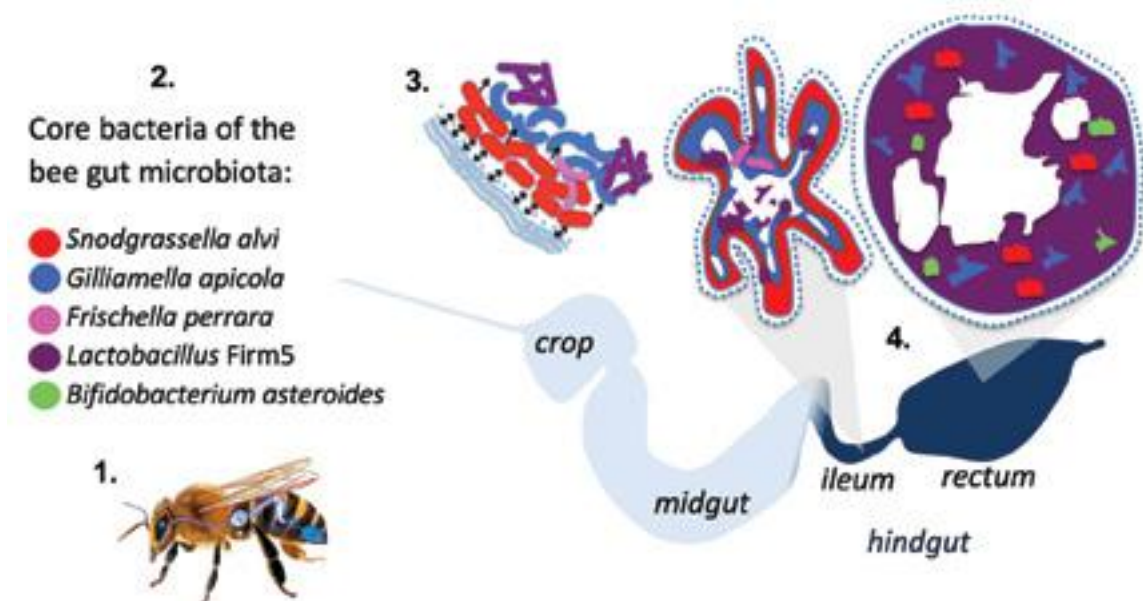
Sagili’s appointment includes extension work where he confers closely with beekeepers, and he plans to give them some scientific answers by doing studies on the

Oregon State University microbiologist Maude David (left) in the lab with her student Grace Deitzler examining a honey bee under the biohood. They are working in collaboration with OSU researcher and extension apiarist Ramesh Sagili to test two probiotic products that are on the market. Photo courtesy of Grace Deitzler



products. He is collaborating with OSU microbiologist Maude David, Assistant Professor in the colleges of Science and Pharmacy whose lab has begun culturing the products.

“This is an emerging field,” said Sagili. “People don’t yet have enough understanding of the science at this point. How did these people decide what to include – by inferences from papers showing specific strains to have some effects? It is an agreed fact that the functional roles of these bacteria are not well understood. These products assume that they are all beneficial. We don’t know the mechanisms, whether they act, for example, on the



1. The position of the bee gut in the honey bee. 2. Five of the core bacteria in the bee gut. 3. A color-coded illustration of how these bacteria align along the gut wall and indications of their symbioses. 4. A diagram of the bee gut from front to back, indicating the concentration of the bacteria in the hindgut, the layering in the ileum and proliferation in the rectum. Illustration courtesy of Moran Lab, U. Texas Austin.

metabolism, affecting the digestion, or on the immune system. If we see some change, how does it work?"

Sagili has mixed preliminary results from a small trial of Super DFM, done last year for the purpose of establishing the protocol. They plan a larger study in April or May beginning with a cage study in the lab in order to ensure delivery of the substance. The next step will be in the field where it is more difficult. The team has a lot of questions about these bacteria. They will examine the effects on Nosema and indirect effects on bee physiology such as the protein levels in the hypopharyngeal gland and midgut enzyme levels, as well as longevity in general.

A second trial of both products, funded by The California Beekeepers Association, is being done by Bee Informed Project Tech Transfer Team member Matt Hoepfinger.

Another One

Not yet on the market is another probiotic for bees intended to stimulate immune response or attack pathogens. It is developed by a team at University of Western Ontario in Canada lead by microbiologist Gregor Reid and Graham Thompson, a biologist specializing in social behavior of insects. The product is unlike the two commercially available in several ways. It contains different ingredients: *Lactobacillus plantarum* Lp39, *Lactobacillus rhamnosus* GR-1, and *Lactobacillus kunkeei* BR-1 and, as indicated by the letters and numbers, particular strains are named. These numbers are important because species name is not enough to uniquely identify the organism.

The initial lab study has been published in the ISME Journal in a peer-reviewed paper. Lead author on the paper, PhD candidate Brendan Daisley, wrote, "The results from our study demonstrated that probiotic supplementation could increase the expression of a gene called Defensin-1-- a key antimicrobial peptide shown to play a pivotal role in honey bee defense against *P. larvae* [American Foulbrood] infection." A disclaimer calls it like it is: "These results should be cautiously interpreted

as in vitro rearing of honey bee larvae cannot perfectly emulate the highly complex microbial dynamics, nor the organized social feeding behaviours that are present in a hive." Fair enough.

Moran is curious. "Kunkeei is the only one [of the three bacteria in the product] found in the bee gut. It is common in nectar, on plants and in the hive environment, but in the bee it is found in the foregut, less than 1% [of the total]. Possibly it can ferment sugar or help digestion or perhaps it dampens the growth of other bacteria. In that sense it is slightly more possible as a component of a supplement. But we look more at the hindgut; Kunkeei is in the foregut." The American Type Culture Collection, a library of microorganisms, notes this strain of kunkeei was isolated from a healthy honey bee hive and was routinely cultured anaerobically.

Elina Niño's lab at U.C. Davis has completed an initial field study using the product in hives with nutritional patties or spray. At this writing, results have not been processed. Another field study, in Eastern Canada, will take place next summer. The formulation has been patented through Seed Labs, but, said Reid, "The company's patents for the probiotics will be royalty-free and available to any beekeepers that want to use them."

Alternatively

Consider the possibly of establishing the effects these probiotic products are aiming for without need for them. A paper is forthcoming from the Spivak Lab showing enhancement of the bee microbiome in the presence of propolis.

In the meantime, it's wait and see to find out more about these products. Some new research data is forthcoming, but long-term effects will take years – if anyone can monitor them that long.

Propolis we have already. **BC**

M.E.A. McNeil is a Master Beekeeper and journalist. Some of her articles can be found at MeaMcNeil.com, and she can be reached at Mea@MeaMcNeil.com.



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“Sex in honey bees is determined by a one gene locus (Mackensen 1951, 1955). If in an egg this locus is hemizygous (diploid cell with only one copy of a gene instead of the usual two copies) or homozygous (having two identical alleles of a particular gene), males will develop; if it is heterozygous (having two different alleles of a particular gene), females will develop. Normally, drones develop from unfertilized (haploid, having a single set of unpaired chromosomes) eggs and workers from fertilized (diploid, containing two complete sets of chromosomes, one from each parent) eggs. But drones can develop also from fertilized eggs, if the sex locus is homozygous (Brückner 1979). Such diploid drones have been raised experimentally (Woyke 1965a), but in normal colonies they would be eaten by the workers at an early larval stage; they are recognized as abnormal (Woyke 1965c). In one population of 65 colonies, about 12 alleles (one of two or more alternative forms of a gene) were estimated to exist at the sex locus (Laidlaw et al. 1956). Since a queen mates with several drones, it is unlikely under normal conditions that the sex locus will be homozygous in many of the fertilized eggs, so no large number of diploid drone larvae will appear (and be eaten by worker bees), which would lead to a scattered brood pattern.”

Extensive research was required to determine that drone larvae can develop from fertilized eggs (diploid drones) and the genetic mechanism that results in their production. “Queens bred for two or three generations by brother-sister matings laid fertilized eggs in worker cells, from which larvae hatched, but only 50% of them survived in the hive (Woyke 1963a). Pieces of worker combs containing eggs laid by these queens were put into an incubator, and the hatched larvae grafted into queen cells on royal jelly and left in the incubator for 24 hours. The sex of these larvae was determined by microscopic anatomical investigations; it could be shown that about 50% of these larvae were male and 50% female. Thus males can develop not only from unfertilized, but also from fertilized eggs; such diploid drones are not seen as adults in the hive, because the diploid larvae disappear from the cells within a few hours of being hatched.”

“A new mechanism of sex determination in the honey bee was suggested on the basis of these results: a series of alleles exists at locus X; heterozygotes result in females, but azygotes (individual produced by haploid parthenogenesis) and homozygotes in males. It was therefore proposed that locus X be called the sex-determining locus, and the alleles at this locus, sex alleles (Woyke 1963a).”

“Queens producing brood of only 50% survival were bred by individual sibling mating. The non-surviving brood in these colonies consists of eggs laid in worker cells which hatch to give diploid drone larvae, which quickly disappear. Hive entrance observations failed to provide evidence that the bees carried the diploid drone larvae out of the hive, and no young larvae were found on sheets of plastic placed under the combs to catch debris. Investigations in special observation hives showed that all the disappearing larvae were eaten alive by the workers (Woyke 1963b).”

“Four queens, giving brood only half of which normally survived, were bred by individual sibling matings. To protect the brood of these queens from bees, pieces of combs containing eggs were put in the incubator without



A Closer LOOK

HOW DRONES BECOME DRONES

Clarence Collison

Haploid? Diploid?

bees. After the eggs hatched, 707 larvae were grafted into queen cells on royal jelly and were reared further in the incubator. On the fifth day the sex of the live larvae could be determined: half were female and half male. The viability of the diploid drone larvae was no lower up to this time than that of female larvae. Larvae were reared further, giving both queen and drone pupae and imagines (final and fully developed adult stages). The larvae from so-called ‘lethal eggs’ which are normally eaten in the hive, are thus viable diploid drones from fertilized eggs. This paper also reports for the first time the rearing of adult drones and of normal queens, beginning from the egg stage, outside the hive without any contact with bees (Woyke 1963c).”

Homozygous cordovan queens and homozygous chartreuse queens (from crosses of heterozygous mutant mothers with mutant fathers) were each inseminated from a single wild-black brother. After tests for survival rate of brood had been carried out, four queens producing low-survival brood were chosen, and the eggs they laid in both worker and drone cells were hatched in an incubator. The

321 young larvae were reared further in the incubator. Drone pupae grafted as larvae from worker cells and originating from the cordovan queen showed some characters of the father. Stronger evidence is supplied by brood produced by the chartreuse queen. Drone prepupae and pupae reared in the incubator from eggs they laid in drone cells showed only the genetic character of the mother, as expected. But drone prepupae and pupa from eggs in worker cells laid by the same queens, and reared from the egg stage in an incubator, showed the genetic character of the father, as did the female offspring of these queens. This proves that drone larvae from eggs laid in worker cells by inbred queens producing low-survival brood develop from fertilized eggs (Wyoke 1965a)."

"Eggs laid by three selected inbred queens producing brood of low survival rate were hatched in an incubator. Diploid larvae from worker cells and haploid larvae from drone cells were reared further under identical conditions in an incubator; 60% of 89 haploid larvae and 63% of a 128 diploids reached the age of five days. About half of the diploids were drones. Of the diploid drone larvae that reached five days, 43% lived to nine days, compared with 36% of the haploids. The average weight of drone larvae at transference to pupation dishes was 357.7 mg for diploids and 296.9 mg for haploids. (The difference was not statistically significant, but might well be so with greater number of larvae). The viability of diploid drone larvae is certainly not lower, and may be possibly higher, than that of haploids: by using right techniques for rearing, it should be possible to rear larger numbers of diploid drones to the imago (mature adult stage) (Wyoke 1965b)."

"A total of 457 diploid larvae from eggs laid in worker cells by inbred queens were hatched in an incubator. They were then transferred into drone cells and put into queenless colonies, with a control group of 75 haploid drone larvae. Half the diploid larvae were eaten during the first few hours after transference, leaving 48% surviving until the next day, compared with 92% haploids. The bees sealed 65% of the cells containing haploids and 19% with diploids, of which 2.8% were drones. After emergence one drone was found to be diploid. Since diploid drone larvae are eaten whether they are in drone or worker cells, the controlling factor is not that they are in the 'wrong' type of cell for their sex (Wyoke 1965c)."

"In order to decipher the assumed scent signals from diploid drone larvae which release the cannibalism behavior of nursing worker honey bees, cuticular extracts of newly hatched and unfed live larvae were made by brief washes in pentane. The first instars were sexed using a recently improved method. The extracted cuticular substances of diploid drones, diploid workers and haploid drones were analyzed by gas chromatography-mass spectrometry. Greater quantities of cuticular compounds were obtained from male than from female larvae, with the diploid drones having a little less than the haploids. The main components in the first instar larval spectrum were identified as four alkanes and squalene, present in the extracts of all three larval types, but in different amounts. No substance was found to occur exclusively on the diploid drones. Their analyzes clearly indicated pronounced quantitative but no qualitative peculiarities in the pattern of cuticular secretions on first instar diploid drone larvae. The pattern differs from both the worker and the normal drone composition and is presumably perceived as odd by the nursing worker bees. This

assumption was bioassayed with dummies impregnated with blends copying the quantitative pattern of the five main components as determined for the three types of larvae. The brood cells containing diploid drone 'dummies' (shaped from paraffin) were emptied significantly faster than those with the worker and haploid drone odor or the controls. According to these within-colony test results, the adult bees can recognize diploid drones by their particular pattern of cuticular secretions. Neither the previous notion of a cannibalism substance nor that of a diminished production of pheromones could be confirmed (Santomauro et al. 2004)."

"Diploid males have long been considered a curiosity contradictory to the haplo-diploid mode of sex determination in the Hymenoptera. In *Apis mellifera*, 'false' diploid male larvae are eliminated by worker cannibalism immediately after hatching. A 'cannibalism substance' produced by diploid drone larvae to induce worker-assisted suicide has been hypothesized, but it has never been detected. Diploid drones are only removed some hours after hatching. Older larvae are evidently not regarded as 'false males' and instead are regularly nursed by the brood-attending worker bees. As the pheromonal cues presumably are located on the surface of newly hatched bee larvae, Herrmann et al. (2005) extracted the cuticular secretions and analyzed their chemical composition by gas chromatograph-mass spectrometry (GC-MS) analyses. Larvae were sexed and then reared in vitro for up to three days. The GC-MS pattern that was obtained, with alkanes as the major compounds, was compared between diploid and haploid drone larvae. They also examined some physical parameters of adult drones. There was no difference between diploid and haploid males in their weight at the day of emergence. The diploid adult drones had fewer wing hooks and smaller testes. The sperm DNA content was 0.30 and 0.15 pg per nucleus, giving an exact 2:1 ratio for the gametocytes of diploid and haploid drones, respectively. Vitellogenin was found in the hemolymph of both types of imaginal drones at five to six days, with a significantly lower titer in the diploids."

"Altogether 301 haploid and 428 diploid drones originating from 33 queens were reared. More than 9500 measurements or counts were made on different reproductive organs of these drones, which were killed on their first day of adult life. The mean length of the testes of haploid drones varied from 4.61 to 5.45 mm, and the mean volume from 1016 to 1427 mm³. Significant differences were found between different parts of reproductive organs of haploid drones originating from different queens. The testes of diploid drones are surrounded by well developed fatty tissue. The mean length of testes of diploid drones originating from different queens varied from 1.81 to 3.44 mm, and the volume from 100 to 416 mm³; the variations in diploid drones were thus much greater than in haploids. The mean testes volume of haploid drones from a given queen was commonly 10 times as great as that of diploid drones from the same queen. The diploids had about half as many of testicular tubules as the haploids, and their vesiculae seminales and mucus glands were 85-95% the size of those of the haploids. No consistent differences were found between the sclerotized plates of the reproductive systems of haploid and diploid drones. The mean dimensions of various reproductive organs of diploid drones originating from different queens differed significantly. The small size of the testes of diploid

drones, one of the factors that make it difficult to collect their semen, might therefore, be ameliorated by selective breeding (Woyke 1973).”

“The process of spermatogenesis was investigated in 35 diploid honey bee drone pupae and compared with that in 15 haploid pupae. Altogether 25,013 chromosomes were counted, and 12,000 measurements were made of cells in different stages of spermatogenesis. The spermatocytes of the diploids contained twice as many chromosomes and were twice as large as those of the haploids. The chromosomes did not pair or separate during metaphase I (prometaphase), when only a cytoplasmic bud was formed. The chromatids separated during metaphase II, and in anaphase a diploid set of chromosomes was visible. Only, one spermatid and one polar body with chromatin were formed from one spermatocyte. Both the nucleus of the spermatid and the polar body were twice as large as in the haploids. The process of spermatogenesis in diploids was very similar to that in the haploids, with no reduction of the number of chromosomes, and thus the diploid drones produced diploid spermatozoa. This was probably caused by the homozygosity of the sex locus (Woyke and Skowronek 1974).”

“Investigations were made on 586 larvae of high and low survival rates; 363 of the latter were hatched in an incubator and transferred on royal jelly in queen cells in several rearing colonies. Of these, 55% reached the age of five days, giving 55% females and 45% diploid males. The efficiency of rearing young larvae was raised after it was found that the workers would rear several female larvae in one queen cell for several days; this was also possible with diploid drone larvae. Although no adult diploid drones were obtained, for the first time many diploid drone larvae were reared in colonies, at least to the time of sealing. The fact that the larvae are on royal jelly in queen cells prevents their being eaten, and suggests that some special substance governs the eating phenomenon. The results obtained make it possible to develop a method of rearing imago diploid drones in the colony (Woyke 1965d).”

“Various modifications of techniques for rearing diploid drone brood was tested on 13,900 low-survival larvae (50% female, 50% diploid drone) from inbred queens. Moderate larval survival was obtained after rearing the larvae in an incubator for varying lengths of time and then transferring them to worker cells, but no adult drones emerged. Satisfactory results were obtained from transferring the diploid larvae to drone cells in a colony after two to three days in an incubator, and adult drones emerged in relatively greater numbers than from control groups of normal haploid brood. Artificial rearing, however, tended to have an adverse effect on survival rate, and to avoid this, larvae were reared in queen cells of equivalent age in the colony for two days before transferring them to drone cells as before; this method was also successful. A total of 2,286 adult diploid drones were reared in the course of this work (Woyke 1969).”

“In order to rear diploid drones with larger testes, the inheritance of testis size was investigated. The genic balance hypothesis was tested in relation to the different additive effects of various X-alleles. Different levels of heterozygosity of multiple loci were also considered. *Apis mellifera adansonii* and *A.m. ligustica* were crossed to determine the X-allele composition of the offspring;

this resulted also in different degrees of heterozygosity in the progeny. About 300 queens were instrumentally inseminated, and haploid and diploid drones originating from 23 queens were investigated; 1460 testes were measured (Woyke 1974).”

“The size of the testes of haploid drones of various groups differed very little. The average volume of the testes of various groups of haploid drones was 2.7-6.5 times as large as that of diploids of the same groups. Diploid drones of African bees had larger testes (mean volume 4.14 mm³) than those of Italian bees (mean 1.82 mm³) and backcrosses to Italian queens resulted in medium-sized testes (mean 2.76 mm³). Homozygosity of X-alleles reduced the size of the testes of diploid drones but this size did not follow the X-allele compositions of the individuals. Thus the different additive ability of various X-alleles was not detected here. An increase of the heterozygosity of loci other than the X-locus did not decrease the size of the diploid testes. The inheritance of this size was in accordance with additive action of special polygenes. Thus, breeding diploid drones with larger testes should be carried out on the basis of polygenes (Woyke 1974).” **BC**

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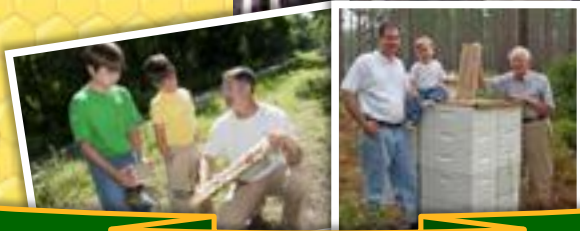
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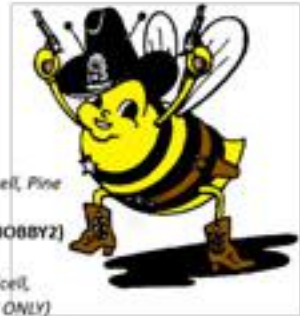
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AMERICAN HONEY PRODUCERS CONFERENCE

Chris Hiatt

51st Annual Conference

The 51st American Honey Producer's Association conference took place in Sacramento in the second week of January. It was a very successful convention and it was great having the Canadian Honey Council and many CSBA members join us. One of the highlights for the executive board of AHPA was attending the ribbon-cutting of the new USDA Agricultural Research Service (ARS) Lab at UC Davis. The AHPA leadership (especially past president, Darren Cox) have worked hard and paid for many flights to DC for meetings to get this lab established. We feel the collaboration between the existing UC Davis Lab and new ARS researchers, Dr. Arathi Seshadri and Dr. Julia Fine will result in the applied, boots-on-the-ground-type research many beekeepers need. While there, we had the opportunity to speak with both researchers while touring their new labs. Dr. Kevin Hackett, the ARS National Program Leader, spoke along with Dr. Elina Nino, Darren Cox and Jackie Parks-Burris representing CSBA.

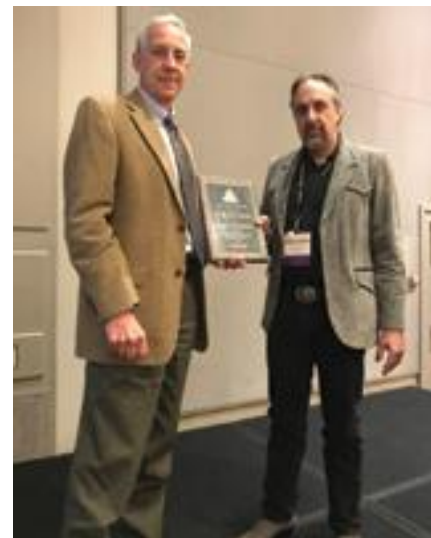
Some of the highlights of the AHPA meeting the first day were hearing from California Secretary of Ag. Karen Ross and also Daren Williams from the Almond Board. We had our almond pollination panel comprising of Bret Adee, Brian Johnston and Ryan Cosyns (between the three, they put out more than

160,000 hives into almonds). A main theme from the panel was that if you charge below \$200 for an eight-frame hive, you are below the average and therefore, bringing down the market. Hives that are running a ten-frame average are getting around \$215 a hive or more. Following that panel, Gloria Degrandi-Hoffman from the Tuscon ARS lab shared her data showing it costs a beekeeper \$200 to get a single hive into the almonds. This emphasized that pollination and honey crop after almonds is what we are living on. We then had the following presentations: Ron Phipps spoke on what is causing low honey prices; Dr. Michael Roberts of the UCLA Food Fraud Center spoke on why we need to fix it by highlighting his new white paper entitled "The Endangered Honey Producer; Mitch Weinberg of GenuHoney then spoke on how to fix it. We ended the first day by hearing Eric Silva (DC Counsel for AHPA) give the AHPA federal policy achievements this year including ELAP implementation resulting in \$29.5 million dollars being paid out to beekeepers last year, honey integrity task force work, helping Customs update their testing capabilities, implementing the Farm Bill in ways such as working with a Pollinator Research Coordinator, and securing additional ARS lab Research Funding. The night ended with a free screening of the movie "The Pollinators."

The second day started with a presentation from the USDA team, who we recently finished working with to make the Commercial Item Description for honey (since we were never able to get a standard of identity). The next step will be updating the 1985 label laws. One suggestion was to copy Canada. If its 100% Canadian, it is labeled as CANADA #1. If a blend, it is #1. Next, Bruker from Germany gave a simplified explanation of Nuclear Magnetic Resonance testing for honey which many (Canada was the first) are adopting. This method, along with High Resolution Mass Spec is highly accurate in detecting adulteration. Randy Oliver then gave us his update on oxalic acid towels and his other projects and was also given an award by Brent Barkman (representing Project ApisM) for his years acting as their science advisor. Dr. Frank Rinkevich from ARS Baton Rouge

then spoke on amitraz resistance. Amitraz shows some degree of resistance but nowhere near as fast as coumaphos or apistan. We then had a roundtable about improving your indoor wintering with Tony Noyes, Ryan Thomas and Dylan Kelly. Many laughed when Tony said the more dead bees in the shed in January the better, because you know you have big hives! Ryan shared impressive photos of his new indoor wintering facilities in Idaho. We ended the night with dinner at the Sacramento History Museum where we were entertained by a bluegrass band and got to gawk at all the gold nuggets displayed there.

The last day, Dr. Brandon Hopkins from Washington State gave updates on his indoor wintering research. Following him, Bob Danka, lead of ARS Baton Rouge, reported on the *Varroa* sensitive hygiene project in Hawaii whose queens maintain lower mite levels than regular Italian queens. He also shared preliminary data showing that feeding microalgae can result in higher bee thorax weight and increased vitogellin levels. Next, there was an open roundtable to answer questions about filing ELAP, followed by Dr. Nino from UC Davis giving updates on her lab and Dave Bradshaw showing slides from the history of his family's bee business. He shared a funny moment when, as a boy, he rode with his Dad in his old truck over the grapevine on I5 and he remembers moving a piece of cardboard covering a hole in the floorboard and watching the highway go by beneath his feet!



Bob Danka, left, receives the "2019 Friend of the Industry" award from Joe Sanroma.

Rod Scarlett of the Canadian Honey Council finished the conference with the Canadian perspective of the honey market and their challenges. It was impressive to hear how much of their imports the government is testing.

That night at the annual banquet, everyone enjoyed our auctioneer/beekeeper Lee Knight run up the auction items to benefit the AHPA. He started the night by putting police tape around the stage so he wouldn't fall off again like last year! The "2019 Beekeeper of the Year" award was given to Randy Verhoek and tribute given by Chris Hiatt. Randy has spent many years and much of his own time and money traveling to represent beekeepers as the AHPA President and/or board member working on H2A visa issues, the Byrd amendment, ELAP, Honeybee Health Coalition establishment, and many other matters. Additionally, Joe Sanroma presented Bob Danka with the "2019 Friend of the Industry" award for his many years of bee research.

The AHPA would like to welcome our new executive board members



Scott Hamilton from Idaho and Matt Halbgewachs from Texas. These men both run big operations and will be valuable representing commercial beekeepers' interests.

After 51 years of meeting in January, we will move our meeting to December for the next convention. We have many members getting hives ready for almonds in January that can't make it to the meeting and also want to make it easier for

vendors and researchers to be able to attend both national conventions. We invite you to attend the 52nd annual meeting on December 1, 2020 in Baton Rouge, LA. It will be co-hosted by AHPA and Louisiana State Beekeepers Association. The American Bee Research Conference will also occur in conjunction with this meeting. We look forward to touring the Baton Rouge bee lab! **BC**

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Benefits

Reversing bees is a hive manipulation that beekeepers use primarily to help control swarming. It does not stop swarming, but it can delay the process by expanding egg laying space in the brood nest and providing ample room above for additional honey storage, thereby relieving congestion in the hive.

What is reversing?

As a colony eats through their honey stores during the Winter, they tend to end up occupying the upper most part of the hive in spring (in a top bar hive, they end up at the far end of the hive furthest from the entrance) leaving the combs nearest the entrance mostly empty and unused. Crammed up against the inner cover of a Langstroth hive, or the back wall of a top bar hive, the bees can start to feel crowded despite there being plenty of room elsewhere. By switching the position of the boxes, or top bar frames, hive congestion is relieved, and the urge to swarm is temporarily suppressed. In a Langstroth hive reversal is accomplished by taking the hive body of combs full of bees and brood and placing them below on the bottom board and moving the mostly empty and unused hive body from below and placing it on top of the full brood box.

When to reverse?

While reversing bees can be useful when done right, it can be useless or even damaging when done wrong. Timing is a critical factor in successful hive reversal. The most appropriate time to reverse a hive is early Spring *before* the first major honey flow which will pack the upper brood area so full that the queen will start running out of space to lay eggs which inevitably leads to swarming. Wait too long to reverse and swarm preparations may already be underway or completed. A hive could potentially be reversed a second time in mid-Summer, although the

amount of labor required would increase substantially due to the increased amount of stored honey in the hive that would have to be removed in order to access the brood boxes. Since the primary purpose of reversing is to open up space in the hive for the queen to lay and the workers to store honey above the brood area, it is not advisable to reverse bees in late Summer or Autumn when hives need to be fully packed with bees, brood, honey and pollen in preparation for the long dearth of winter ahead.

Ideally hive reversal occurs after average daytime temperatures are regularly in the 50-60°F range (10-15.5°C) and on a sunny day that is above 60°F. Try to reverse bees too early in the year, or on a cold day, and you may cause significant amounts of brood to become chilled and die.

Primary benefit of reversing

As mentioned, the primary benefit of reversing is to delay the instinct to swarm and help insure the maximum bee population is available to gather the honey crop. Reversing accomplishes this in two ways. The first is by preventing approximately two-thirds of the bees from flying off with the queen in search of a new home. While over time an unreversed hive of bees will eventually move downward in the hive and start to occupy empty combs below the brood nest, bees have a general tendency to prefer to move upward. Crowding is likely to encourage them to swarm before they start to expand the brood nest downward in a Langstroth hive or back toward the entrance in a top bar hive.

The second way reversing suppresses swarming is to increase space in the brood area for the queen to lay. This typically has the effect of encouraging the queen to increase her egg laying and build up the colony's population faster than would otherwise be the case. All things

being equal, a hive that is reversed will have a larger worker population four to six weeks later than a hive that is not reversed. This can make a big difference in whether a honey crop will be harvested later in the year or not.

Additional benefits

The process of reversing a hive also provides the ideal time to inspect the colony to ensure they are queen right and have at least a couple frames of honey. Weak hives should not be reversed but rather carefully inspected in order to identify the reason why they are not thriving. Large patches of capped worker brood and un-hatched eggs are a good indicator that the colony is queen right. Hive bodies and supers that are heavy suggest the colony has plenty of honey and is not suffering nutritional stress. Be on the look out, especially in weak hives, for signs of disease or heavy pest pressures from moths, beetles and mites. While such weak colonies are not strong enough to be reversed, it is a good idea to be sure they are centered in their hive body so that they are free to expand in any direction that suits them. By removing hive bodies and supers that are not being used by weak colonies in Langstroth hives, or using



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a follower board in a top bar hive, damage to the hive's unused combs from wax moths or small hive beetles can be avoided.

The Strong hive

Alternatively, take note of very strong colonies while reversing and consider propagating them a little later in the season by making nucleus colonies or using them to raise queens to use in splits. To facilitate this process add a lot of room to the brood area in strong colonies. This means extra frames of comb between some of the brood frames in a top bar hive, or even adding a deep hive body full of empty drawn comb on top of a hive body of brood in a Langstroth hive. About three or four weeks later, the additional deep that was added can be removed and the bees, brood, eggs and honey it contains used to make nucs.

The medium hive

Be careful not to break up the brood nest when reversing medium strength colonies, since a relatively small population of bees may not be able to adequately cover and warm frames of brood that are spread out rather than concentrated in one area. This is not a major concern when the entire brood nest is in a single hive body, but if the brood area spans two boxes reversing may break the brood so it is difficult for the colony to maintain the proper incubation temperature. This is where good judgement and experience come in handy. In a top bar hive, keep combs in the same order they were in after you move them rather than change the order of the frames or insert empty combs between frames of brood.

The condition of the bottom board can tell you much about the condition of the hive you are reversing. The brood in this colony is well centered in the hive as indicated by the significant amounts of fresh pollen that has fallen from the brood nest. While the colony is not yet strong enough to clean out the bees that died over Winter and fell to the bottom of the hive, they are working on removing the green ApiLife Var essential oil treatment that was left in the brood nest following an Autumn mite treatment."



Good Housekeeping

Reversing is also a good time to scrape off any burr comb that has built up on the surface of the top and bottom bars of the frames of the hive bodies and supers. Frames in hive bodies that are not being occupied by bees should be removed, the inside of their box scraped smooth of wax and propolis and the frames cleaned up before being returned to the box. Clean off the bottom board if needed before restacking the hive bodies, and scrape the burr comb off the underside of the inner cover before replacing it on the hive. Don't forget to level out the hive stand if needed before putting the hive back together. This is also the perfect opportunity to repair or replace any equipment that has become rotten, broken, or damaged.

After the brood nest has been reversed, place any full supers of honey (or top bar frames of capped honey) back into position above the

opened up brood nest (or on the far side of the brood area in a top bar hive).

The only way to keep a colony from swarming at all during the season is to enter the brood nest on a weekly basis, replace some of the full frames of brood with empty ones, and to always be sure there is space above for honey storage. Even then, swarm cells may appear and efforts to cut them out too often simply ends in failure. In most cases, the work that is required to actually stop a colony from swarming is not worth the effort involved. Generally, it is much more efficient in terms of labor to simply reverse hives and super them in a timely manner to suppress the urge to swarm and hope for the best. **BC**

Ross Conrad is author of the newly released Land of Milk and Honey: A history of beekeeping in Vermont and Natural Beekeeping: Organic approaches to modern apiculture, 2nd Edition.



To make reversing easier, leave the inner cover on the top hive body that is removed from the top of the hive and place the box in the inverted outer cover in order to keep it out of the grass and dirt. Subsequent hive bodies can be placed on level ground on their short side until needed. By waiting to remove the inner cover until after the top box is placed on the bottom board, there is less disturbance to the bees and it helps reduce the chance that they may become defensive."



The Other Bees

We Are Not Alone

Sam Droege

Species in The United States: 134

Species in Canada: 40

Common everywhere

Size Relative to Honey Bee: ½ - 1.5X

Flight Season: Spring to Fall, primarily Summer

Nest: Solitary nesters in holes in wood, hollow twigs, or in the ground. Nest partitions made of leaves, petals, mud, or resin.

Field Marks (use butterfly binoculars!): Completely black skin (integument), most of the time with bright white hairs in bands on the abdomen, and white hairs elsewhere on the thorax and head. Some males have pale front tarsi and tarsal segments, these usually immensely expanded in width and used to cover the eyes of females during mating. Carries pollen UNDER its abdomen, not on its legs; these hairs can be white, brown, tan, black, orangish, but most commonly white. Compared to other black members of its family they average larger, hairier, wider, mid- and hind-legs stouter, out later in the year, and much more common. Abdomens held rigidly straight behind them, does not sag downward. Females, in particular, will often arch/curl their abdomens up/backwards exposing pollen or pollen carrying hairs. Female mandibles wide, stout, shear-like. Male mandibles less massive than female but still prominent. When

feeding on flowers hold their wings at a 45° angle to body in the Wide-Bodied Group but often overlapping on the back in the Narrow-Bodied Group.

Use in Agriculture: Critical for alfalfa pollination and *M. rotundata* is raised commercially for that very reason; found in abundance pollinating soybeans (increases yield), sunflowers, and other summer blooming crops.

Leaf-cutters are the wide-bodied truckers of the bee world. Rather than transporting their pollen on their legs, they move dry pollen to the specialized pollen carrying hairs under their abdomens (nectar is carried in their crop). They are common and many are “weedy”, hanging out in the most disturbed, industrial areas that you can imagine. Others are highly restricted by their pollen preferences such as the rarely found *M. brimleyi* and *M. integra* which specialize only on wild viney native milkpeas or fuzzy beans (sadly they seem to have no interest in garden bean or soybeans). From a field perspective *Megachile* can be divided into a Wide-Bodied Group and a Narrow-bodied Group. The narrow-bodied groups is less common and often uses resin to separate its nest cells.

What can you do to attract these bees? Plant things in the pea (*Fabaceae*) and composite (*Asteraceae*) families. That would include things like the native sunflowers, beans, clovers, indigo bush, blanketflower, wingstem, vetches, goat’s rue, acacia, cactus, aster, goldenrod, thistle, rabbitbrush. Many nest in cavities, so you can



Wide body.



Leaf cutting mandibles.



Male showing expanded tarsi to cover the eyes of the female.



Female with her butt in the air.

provide some low-budget housing by taking a portable drill and using bits from 1/8 in. to 3/8 in. drilling any piece of dry wood on your property (be sure to clean the sawdust out of the hole out as you drill), this can be fence posts, fire wood, the rafter tails on your shed, dead wood on existing trees or downed logs – give the drill to a kid, they will have fun and get outside. Alternatively, bundle last season’s tall ornamental grasses, cane, or Phragmites and tie off sections a foot apart and cut in between with a hand saw to create instant bee housing, place around the yard in spots protected by the sun and rain. Keep one by the kitchen window so you can watch the action. There are no stinging issues with this group. **BC**

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University Of Illinois Bee Research

Varroa IPM

Adam Dolezal

As beekeepers and scientists, we make colony management decisions based upon best management practices in order to keep the honey bees at the University of Illinois Bee Research Facility healthy. We are stringent in our *Varroa* mite monitoring and treatment program; this involves monthly alcohol washes, regular drone comb removal, brood breaks when possible, and chemical treatment when necessary. This approach, which most would consider an application of Integrated Pest Management (IPM), combines monitoring with a hierarchy of responses. In theory, this allows beekeepers to make scaled decisions that keep pest pressure down while reducing unnecessary applications/treatments. For the U of IL bee research labs, this comprehensive approach to mite control is applied very rigorously – more so than would likely be practical for most beekeepers – as it is important for us to ensure our bees are healthy enough for experiments (which are often yet another stress the bees face).

In spite of this regime, sometimes the mites win. Without the intensive level of monitoring done on all of our colonies, we might not know that we're losing the fight until it's too late. During this past Summer, we discovered a colony where the mites were winning despite our best efforts, and this wasn't easily visible - even to the trained eye. We've shared the story of this colony, referred to here as Mite Colony (MC), with many beekeepers, including attendees of the Illinois State Beekeepers Association Fall meeting, and received a lot of interesting feedback. While there are still mysteries, we think there is something to be learned from this experience as a case study in the difficulties of IPM in beekeeping.

A bit of background on MC and a similar colony in the same apiary, who we'll call Healthy Colony (HC), for comparison. Both colonies' queens were purchased from the same large commercial queen producer and installed in 2018. They received oxalic acid vapor treatments during winter 2018. Beginning with inspections in the spring of 2019, both colonies seemed optimal – queens with quality brood patterns and strong enough to require splitting in May to prevent swarming. While alcohol washes

showed that the mite levels in MC were above the treatment threshold that we maintain for our research colonies (the relatively stringent 1% or 3 mites/300 bees), the levels were just surpassing the threshold established by the Honey Bee Health Coalition (2-5% or 6-15 mites/300 bees; <https://honeybeehealthcoalition.org/varroa/>). As a result, all colonies in the apiary, including MC and HC, were treated using Mite Away Quick Strips (formic acid strips) during the middle of June.

For weeks after the treatment, both colonies seemed to have responded positively. If it weren't for the unique experimental setups of the many research projects conducted at the University of Illinois Bee Research Facility, we may not have realized something insidious was happening inside MC. Specifically, most experiments at the Bee Lab begin with "day-old" honey bees; these are collected by storing brood frames with newly emerging bees in an incubator and brushing the day-old bees from the frame daily. These "day-olds" allow us to age-match bees for experiments and, because they cannot fly, aid in setting up

experiments. When setting up the experiments, which often involves plastic bins filled with thousands of crawling bees, we monitor them for mites and signs of Deformed Wing Virus (DWW).

On July 22nd, brood frames of newly emerging bees were collected from 8 colonies including both MC and HC. On July 23rd, during the experimental setup (which involved individually-tagging each individual bee!), high levels of phoretic mites and bees with deformed wings were observed. The 6.7% mite load (188 mites/2823 bees) was alarming considering the day-olds used in experiments the previous week had 0.6% and 0.8% mite loads. On July 24th, we followed up by doing alcohol washes on the day-old bees and found that while HC had an undesirable 5.3% mite load, MC had a mind blowing 51% mite load.

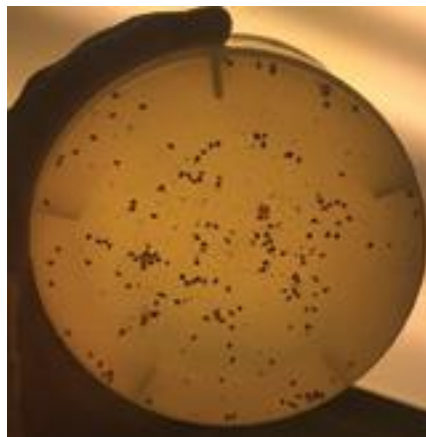


Photo of alcohol wash container; we estimated 153 mites in our 300 bee wash – over 50% infestation! (photo by Alison Sankey)



The colony looked very healthy on the surface, with good brood patterns, strong population, and lots of honey. Washes on nurse bees were comparatively low until 3+ weeks later, when mite levels were >30 per 300 bees (~10%). This was despite "day-old" bees exhibiting >50% infestation earlier in the Summer. (Sankey photo)

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Another photo of MC frame/brood pattern. (photo by Alison Sankey)

Mite wash from August.



We returned to the colonies on July 24th to do a field alcohol wash on the nurse bees, per normal alcohol wash procedures; surprisingly, the levels of mite infestation were barely above our very low 1% threshold. While we did see bees with DWV being removed from the colony entrance at MC, the colony look healthy otherwise - the queen was still laying well and the brood pattern remained good. By this point, the colony had also nearly filled three medium supers with honey.

Throughout the rest of the summer we continued to monitor MC and HC. MC's mite levels rose exponentially and HC's rose predictably, but never to a very high

level. It took three to four weeks from our initial observation for the MC colony to have mite levels that would really warrant treatment, but this rise occurred dramatically, with mite levels jumping from five mites/300 bees to 33 mites/300 in a single week. At this point most beekeepers would have performed a brood break, done another mite treatment, requeened the colony, or any combination of these to try and remedy the mite and virus issues. However, since we're researchers with a keen interest in honey bee health and colony dynamics, we wanted to record in real-time the changes in the colony as a result of the mites. Before an inevitable collapse, we collected

as many samples from MC as we could; frames of honey, pollen, bees and brood are all in the chest freezer. Collecting the queen, marked red (the queen color of 2018) and while she walked across a frame completely laid full with eggs, was the hardest. She had continued to do the best job she could in spite of the mites and virus overrunning her colony. We think that's the lesson to take away from this saga - even when we're trying our best to be responsible beekeepers sometimes things can still fall apart around us. The most important thing to do is not write off a failure as an anomaly and move on, but share your experience with others in hopes that they have some insight to share! **BC**

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HORIZONTAL BEEKEEPING – PART III

Tina Sebestyen

April is the month that bees come in, and the new year begins for beekeepers. The beekeeper's motto, "this will be the year!" is in the forefront of our minds. Maybe this is the year you transition to long Langstroth beekeeping, or to top bar beekeeping, or maybe you are just getting started in beekeeping. Hive bodies should be painted well in advance of moving bees into them. Paints, stains, and oils all give off fumes that can be harmful to bees, or that can make them abscond from the hive. Consider using paint colors and designs to help the bees find the right hive to return to every time. Guard bees will allow entrance to bees whose honey stomachs are filled with nectar, and bees tend to drift from hive to hive quite a bit if the boxes all look the same, are facing in the same direction, or the wind blows the bees off course. Many beekeepers like to use one base color for all of their boxes. A distinctive color helps in apprehension of stolen hives, and makes ownership recognizable. This can be valuable even in instances where theft isn't the problem. For instance, I received a call last year from a passerby who saw a whole outyard that had been attacked by a bear. I had only to ask the color of the hives to know who to call to save his bees. So, one base color is fine, or multiple colors work well, too, such as all pastels, or all primary colors. Making hives distinctive to the bees can be done with silhouettes over the entrances, and should be done before moving the bees in.

Hive Placement- Reduce Drift

Even more important to making hives distinctive is their positioning. We beekeepers always want the best for every hive, so we face every hive in the "best" direction, and most people think that means south. What is really best for the bees, however, is help in reducing drift, which in turn helps reduce mite and disease transmission. Bees use landmarks as cues in orienting to their hive entrance.



Hive a package of bees near the front of a top bar or long Langstroth. Give them time to settle out of the air before replacing bars.



These bees are preparing to swarm, they are hot and crowded. Add drawn comb to the brood nest long before the colony reaches this state.

A row of identical hives all facing the same direction isn't the best. A better idea is to place the hives in a circle, with entrances facing in. This way, each hive has a different bush, tree, or view from the front. If you can't break out of the rows (they are more conservative of space, which may be at a premium in a bear-proof enclosure), at least face them in different directions. I try to avoid facing them north, if possible, though I've done plenty of bee removals from north facing houses where the bees were prospering nicely.

In horizontal beekeeping, it is nice to face the long side of the hive to the sun, and let the entrance be to either the east or to the west. If there are no bear issues, placing the hives 100 yards apart allows us to face them all in the same direction without confusing the bees, and definitely reduces disease transmission. Facing the long side south to the sun also means that the frames alignment is north to south, the bees preferred direction (usually).

The height at which you situate horizontal hives is a consideration, as well. The height can easily be changed, depending on what type of legs the hive has. I use metal fence posts, pounded into the ground, not easily changed, but stronger if challenged by a bear or cow. The hive can even be screwed to the fence posts, which makes it very difficult to over-turn. For hives that will be used in single queen/single colony beekeeping, having the hives at almost waist height is convenient, and very easy on the back. This works well for queen rearing, as well. For hives that will be used in a two queen system, where supering over the center of the hive is required, the height should be mid-thigh. We'll discuss the two queen system in future articles. For beginners, it is best to stick with the basics, so plan for single queen beekeeping to start.

Hiving a Package of Bees

One of the very few down-sides to horizontal beekeeping is the fact that most beekeeping books and writings refer to Langstroth style beekeeping, and this can make beginners feel unsure about the advice they are receiving. Never fear! Bees are bees, whatever the house looks like. Hiving a package of bees in a horizontal hive is very similar to doing it in a regular Langstroth box. The only real difference is that in a regular Langstroth hive

body, the bees are shaken over the queen cage in the center of the box, and in horizontal beekeeping, the queen cage is hung about four frames back from the entrance and the bees shaken in at this location.

Once the package of bees has rested for an hour after transport, and in the late afternoon (to reduce absconding), take the package to the apiary. Remove bars or frames three through nine, and place the follower board behind number 10, counting from the entrance. Shake the bees into the space created and begin replacing the bars or frames. Hang the queen cage between frames four and five. Once most of the bees have settled out of the air, place the burlap or cover strips, if using, and the top. Add the entrance reducer. We have created a place the bees will feel like they can defend, without over-crowding them. Hive a nuc near the entrance as well. Understanding how the bees want the colony to be ordered answers all the questions we could have. The bees' normal organization of a horizontal hive begins with a honey frame right at the door followed by one frame of pollen/bee bread. Brood frames should occupy positions three to 18 or so, followed by the honey stores.

Feeding

Another tricky part of horizontal beekeeping is feeding sugar water. This is where the long Langstroth hive has a distinct advantage over the top bar hive, since a frame feeder can easily be used. It should be placed in the front of the hive, so that the top can be slid back just a bit for filling without disturbing the new colony. The frame feeder could be used in place of the follower board in position 10, as well. For top bar hives, one of the best ways I have found to feed sugar water is to use a small trash can from the dollar store, one that will rest on the bottom, if possible. It will hold a gallon or two of sugar water, and packing peanuts or straw floating on the surface will keep too many bees from drowning. The foundation strip of the last bar should touch the edge of the can, so that the bees can easily walk in and out. Before filling, roughen the interior of the can with coarse sandpaper. In either top bar or long Lang hives, if the entrance is made tall enough, a Boardman feeder can be used as well. It has been said that Boardman feeders encourage robbing, but this has never happened in my apiary, maybe because of the hives facing in different directions. An entrance reducer should definitely be used to help with defense. Do not use anything scented in this style of feeder. The bees will find the sugar water without the assistance of Honey B Healthy or essential oils, and there is no need to increase the risk of robbing by adding a scent.

Management

As bees in a new colony draw comb and begin to grow, their first priority is brood. The first few combs will be sized for brood. Soon, however, a major honey flow begins, and the bees start drawing comb sized for honey. In my part of the country, they usually get five or six bars or frames of brood going, and then start storing honey in the next combs. The queen is now confined by the honey to a pretty small brood chamber, and even a brand new colony will swarm under these circumstances. This is what it means to be honey bound. The solution is to move the honey bars or frames a bit further back, and place new ones, with or without foundation, behind the

brood, and in front of the honey. Always be sure that the bees have room to expand the brood chamber, but don't break it up. Add new bars or frames behind, not in the center of the brood. It is important that the small cluster of bees be able to warm the brood during long, cool spring nights, so don't break up the brood chamber.

Foundationless Beekeeping

Allowing the bees to build their own comb has many benefits, although there is no evidence that smaller comb size helps against mites. One of the benefits of going foundationless in frame hives like the long Langstroth is that the bees will raise quite a few more drones than they will be able to in full-foundation colonies. Having skies full of drones that display desirable traits is a wonderful and important thing. Lots of drone brood in a colony gives a place for mites to reproduce away from our worker bees. That is a good thing, but it can also produce more mites than the colony can handle. One way to strike a balance between allowing the colony to raise as many drones as they would like, and keeping mite numbers low is to cull drone brood once a month. For every ten frames of mixed brood, one frame of drone brood should be removed monthly. In foundationless beekeeping, the drone brood is seldom in one place. Rather it will be in softball-sized groupings here and there. Insert a honey frame near the brood chamber, and the queen will fill it with drones, and this can easily be removed, frozen, and replaced, thus preserving that precious drawn comb. Freezing the drone brood also makes it easier for humans to remove the brood to see how bad mite infestation is. If this is not done, the patches of drones can either be cut out and fed to the chickens, or the larval drones' heads can be cut off with a serrated knife. The bees will clean the dead drones out and start over, though the foundress mite may survive, but this allows the comb to be preserved.

Using full sheets of foundation confines the bees to producing only worker brood. This can be quite handy at times. When a honey flow is coming in, without foundation, it is practically impossible to get the bees to draw anything but honey comb. If they become honey bound, and no new worker brood comb is being drawn, a swarm is inevitable. There are times when foundation makes beekeeping very much easier for humans. Full sheets of foundation can, of course, be used in Langstroth style frames, and can also be wedged in the top bar kerf and nailed in, just like the guiding foundation strip. A mix of full foundation and foundationless can be used very successfully, so that humans and bees can enjoy the benefits of both.

Cross-Comb Nightmares

Do not forego the guiding foundation strip in either top bars or Langstroth frames. It is very important that the bees build comb in the right direction, in the centers of the bars or frames. Cross combing is a terrible nightmare, difficult to remedy. Cross-combing cannot be tolerated, because it means that the brood chamber cannot be accessed by the beekeeper. The colony could go queenless, be devoured by mites or be festering with disease, and the beekeeper would never know. The one-and-a-half inch strip of plastic foundation, well coated with beeswax, usually solves the problem before it develops.

If cross-combing is discovered, the sooner it is

remedied, the better. Once new, fragile comb gets filled with honey, it is very heavy and almost impossible to re-use. If cross-combing is caught when there are only a few brood combs going the wrong direction, it can be set right, though not very easily. Remember that the queen will be in the brood nest. Pick up the five or six bars that are tied together with the cross-comb, and shake the bees out into the bottom of the hive. Set the bars upside down on a stable surface like the top bars at the back of the hive, and using a serrated knife, cut the comb free. New comb is very soft and fragile, so some of it will be crushed, but don't worry, the bees can fix it. Using bird netting like what is used to keep cherries safe, staple one edge to the top bar, place the comb in the sling created, and then staple the other side back to the top bar. Hang them back in the hive and the bees will fix the damage and hopefully build in the right direction. It can be helpful to have one bar with a full sheet of foundation, and move it along behind the bars being drawn, to make the bees build in the right direction. Bees can sense north and south, and magnetic lines in the earth. If they insist on building across the bars, even with the encouragement of good guides, there may be a ley line influencing them, or they may be building in the direction to which their former home was oriented. Simply turn the hive to match the direction they want to build comb. Most times it is better to help the bees do what they want to do than it is to try to make them do what we want them to do.

We have now made the hives distinctive to reduce drifting, oriented them well, hived our new package or nuc, and helped them begin to grow properly. Next month, we'll discuss splitting a horizontal hive, splitting a vertical hive into a horizontal one, and even moving bees from a regular Langstroth into a top bar hive. **BC**

Tina keeps bees in top bar, Langstroth, and long Langstroth hives. She learned beekeeping from wonderful mentors, "old guys", as well as through mentoring as founder of the Four Corners Beekeepers Assoc. She is vice president of the Colorado State Beekeepers Assoc. and is currently working to produce the Master Beekeeper Program for the state of Colorado. She writes from home in SW Colorado, and speaks about bees everywhere she gets the chance. She can be reached at bee.seeking@gmail.com

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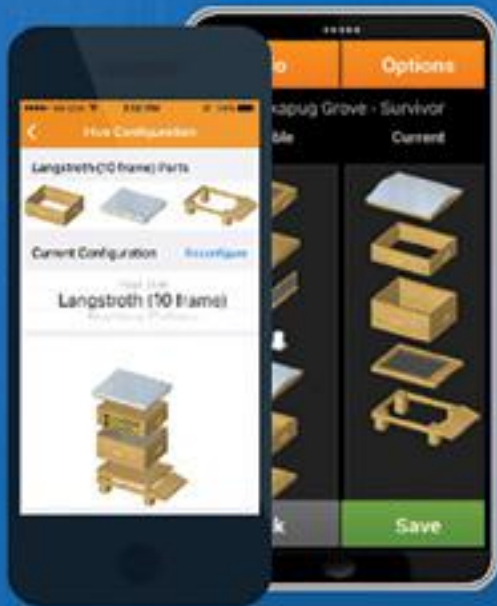
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Queens – What To Choose

Lots To Review

No, the queen in that hive is not dead – she is just fizzling out. Not enough eggs laid; population declining; all happening right now! In my area, the Virginia Blue Ridge Mountains, it's early Spring. Should I have this colony raise a queen? Yes, but at this time of year in my area plus thinking about my time of honey-crop nectar flow, and considering the variable Spring weather, buying a mated queen is the most sensible thing to do. Now that a decision has been made, the next step is – where can I get a queen?

I know that “local” queens are popular with many beekeepers across the country. However, I am a bit too early for “now” for a local one. I did contact a local queen breeder that has supplied excellent queens in the past. However it's not only a bit too early for those queens right now, but there's a waiting list already formed. So I will have to look elsewhere.

Here's my new *Bee Culture* – arrived at an appropriate time. Let's see – a quick flip-through showed some advertisements for queens. However during the flipping, I got sidetracked and read some articles. Great information was gained but I am worried that my fizzling-out queen

could just quit laying. So, there at the end of the magazine is the page with Display Advertisers.

Have you ever used this? It's an index to all the advertisers in the magazine. They are grouped in several categories, one of which is Bees and Queens. Now the search for a queen can be organized. All I need to do is go down the list, turn to the designated page and see what the advertisement has to say. I can find out where the queen breeder is and something about what sort of queen she is. There are 25 advertisements listed with their page number. I certainly should be able to find a good queen in that big assortment. However it will take some time. I know I'll end up reading more articles during my queen search.

The first ad lands me in an article I do want to read but I'll do that – later. This ad is for Italian queens from California. Italians are nice bees. California certainly has better weather for producing early queens. So this company with its long history of queen production is a possibility. No prices are given so I will have to use the contact information to find out more.

The next on the list takes me to a full-page ad that is very impressive. There are breeder queens and production queens for appropriate prices, but I do not need those. This company does have naturally mated queens for \$40. The photo shows what could be a fairly dark bee. And it could be a *Varroa* Sensitive Hygienic, a VSH queen). That could be interesting and helpful with varroa control. So more information is needed either by phone or email.

Then I go to a page that actually has two ads for queens. I'll review the second one in its turn. Again the queens are from California. I can have my choice of Italians or Carniolans. The prices seem quite reasonable. A website is the only contact given for information or ordering. I am not certain I can order just one queen since the price list starts at five to 10

queens. The ad said I should place my order now since queens go fast. I'll have to find out when delivery starts.

Back to the index. This next company is in Indiana. It sells a full range of equipment and mentions Indiana queens but is not more specific than that. I wonder if Indiana is far enough along with Spring to have a supply of queens. At least there is both a phone number and a website for more information. Since Indiana is closer to my home in Virginia, would an Indiana queen be considered more local? A visit to the website gave me more information. There were two categories of queens: early season queens and Indiana queens. The early season queens undoubtedly came from a warmer climate. Prices were the same, \$40-45. I'll keep going down the list.

The next one has several equipment outlets in Ohio. Although the website mentions bees and queens, they would not be local ones in early April. But the next one will – it's in Georgia and has been a family business for a century! One Italian queen would be \$29 plus shipping. This supplier could be a good choice but to be fair, I'll continue down the list.

The next one is now in contention – it's in Georgia also and an old respected company, too. This company offers Italian queens for



\$21 plus shipping. But I could choose to have a Russian Hybrid queen for \$23.50. Marking is \$2.50. Marking is nice and I frequently mark my own queens just because it helps in finding her. That Russian hybrid does sound interesting.

The next one is in Florida and is advertising Carniolan, Italian and "VHS" (could that mean *Varroa Sensitive Hygiene*, VSH?) Since there is both a phone number and an email address it will be easy to find out. However I do have another question. Florida now has the African bee throughout. I certainly do not want to import any of those "defensive genes" so I have some questions to ask before considering buying a queen.

Well, there was a mistake in the index page for the next one so I will try to find it as I continue my search. I did find the Northern California queen company but they are probably selling more to the big commercial outfits since their ad only showed a price for a 100-pack of queens. I doubt they would be interested in shipping just one queen across the country. Going down the list the next one is offering packages and queens in three Midwestern states of Ohio, Michigan and Indiana. These were brought up from the South I am sure.

Next I am guided to the Pacific Northwest for Caucasian and Survivor Stock. There is a phone number and website but I do not think their queens would be ready just yet. In addition I am not certain the resulting Caucasian colony would be happy in the Virginia mountains. It's a quite different climate than the Pacific Northwest.

I am given two separate pages for the next one on the list. One is full-page; the other page is a smaller advert only for nucs. Returning to the full-page I find I can choose between Saskatraz, Carniolans or Italians, raised in California or Hawaii. Perhaps this is the year I should try a Saskatraz queen just to see what those bees are like.

My next one on the list is another

old Georgia bee company. However I will have to phone for prices and availability. So I will do my inquiries later. Certainly shipping time from Georgia will be short so that is one consideration to keep in mind.

We swing North – very far North – to Vermont for the next entry on the list. Although Northern Survivor Queens are advertised I don't think they would be ready yet. Going



onward – there's another glitch in page number. So I have two queen sources to look for later.

Here is a state not represented so far – Louisiana. It certainly has a climate that would be warm enough for early queens. But what kind? At least the ad has telephone numbers and an email address for information – Yes, what kind of queens, how much and when available need to be known.

The next ad is from an Alabama company that also advertises equipment. It does have phone numbers and email address so if there are any queens and when available can be found.

I don't have to search for the next one on the list since it's on the same page. This is an old California company offering Russian, Carniolan, Hybrid, and Italian queens. No prices are given but a phone number and website are given. One of the websites is very good – educational – so spend some time on it and learn something!

www.glenn-apiaries.com/genetics.html

Only a few more left on the list. So let's have a look at R Weaver, in Texas, who has Buckfast Queens. You can visit the website or phone to find out when queens will be ready. The Buckfast queens at \$35 are only a few dollars more than Italians at \$32. Marking is \$3. A Buckfast queen could be interesting to try. They have been bred at Weavers for many years.

Close to the end of the list! Now we arrive back in Georgia at Wilbanks Apiaries. This family has been raising bees and queens for over 70 years. A phone number is given for orders and information. So I will need to do that before making a decision. I am sure they would have a queen for sale at this time. It's warm there before here in Virginia.

This next one is a puzzle. The apiary is in Tennessee but it is advertising Mountain Grey Caucasian with the subtitle "Republic of Georgia." The Puzzle was solved on their website – they began their line of Caucasian with semen from Sue Cobey who had permission to import semen from the Republic of Georgia. One of these queens, this year, costs \$60. Well it might be interesting to try someday but I do not think a queen will be available this early.

The last one! Z's bees in Northern California. They are advertising Cordovans, Carniolans and Italian bees this year. You can visit their website where you will get a view of all the colorful hives they use. I am sure they understand their color coding. I hope their bees do!

Yes there were two from the list I never found. I'll keep looking. But I certainly know who has queens when and what kind and how much. The tour through "queenland" was really quite informative. The list of advertisers made it easy to find queens that would be ready to buy now. However it brought decisions that have to be made – now – because my queen is on her way out.

It is tempting to try something quite different. Or should that wait for another year? I think I'll put my order in tomorrow morning. I'll tell my current fizzling-out queen she is about to be dethroned. She will probably find it a relief. **BC**

Ann Harman is always challenging us from her home in Flint Hill, Virginia.

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Honey And My Respiratory Health



Honey can help, sure won't hurt.

At this very moment, I don't feel well. Actually, I don't feel *good*, but *well* is grammatically proper. I'm in no mood for quibbling. For years, all of these years and years of past articles, I have steadfastly told you of real and honest events and experiences. But now I find myself boldly being pushed into my 70s. I expected this decade to be about the same as all the other decades that have come and gone. No, not so. This seventieth decade has immediately demanded my health attention and made it clear that this decade would not be the same as the others.

This is my dilemma. How much truth do I write for you? Do all of you younger people want to hear what awaits you as you age? I don't think so. As a younger beekeeper, I would have moved right along to another article. At the time, I was beautifully healthy. I was confident and arrogant. I had every intention of living forever. So, I understand what many of you younger folks are thinking at this point. I suppose the most I could ask of young readers is only skip this particular section.

I presently have some neck glandular issues that can only be rectified by surgically removing the offending glands that here-to-fore have always been there for me. For some months, I have been dealing with a weak, laryngitis-laced voice. This issue may (or may not) be caused by my recalcitrant glands. The tolerant West Virginia audience to whom I recently presented a talk—apparently on the subject of coughing—can attest. Talk and cough. Talk and cough. That seemed to be my plan. Hardly an enlightening 45-minute cough talk on honey bee wintering biology.

All of my previous career, I have presented serious, but superficial, attention to the health benefits of honey.

Why? I was healthy and I always would be. This info was for others. But now, this laryngitis thing is disrupting my ability to present a normal talk, or even speak normally. Now this honey-health info relates directly to me and that's a different situation for me.

I have several medical people helping me with this issue. One of my physicians, whose father was, for a while, a beekeeper suddenly said in passing, "*Why don't you try honey?*" (Had the doctor's father not have been a beekeeper, I doubt that he would have blurted that comment.) Defending myself, I must tell you that I was already taking a spoon or so of honey as I tired of lozenges.

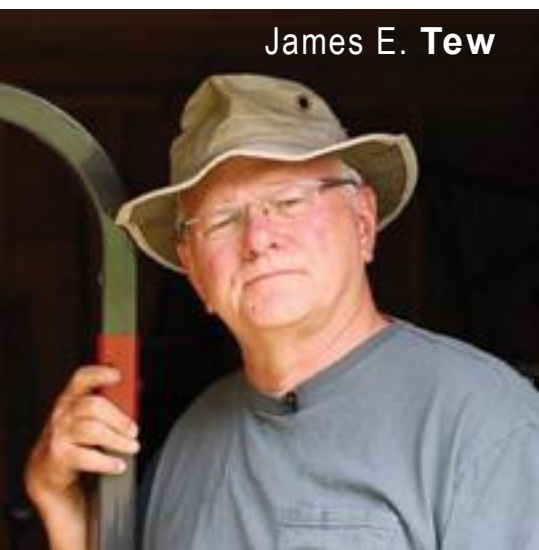
Inspired by my honey-recommending-physician, I went to the medicinal honey literature and found far more citations than expected. As is always the case on web searches, I was exposed to all levels and types of discussions. Some were good while others were not. My honest first impression was that this large citation list was overwhelming. As I tried to sort and search, the process became even more challenging. I wanted to know if honey could help with coughs and throat issues.

I may have stumbled into the difference of one *writing* about honey consumption and cough issues compared to one who actually *has* cough issues and is inquiring if honey could help. Yes, honey is good. Yes, early Egyptians used it for such issues. Manuka and buckwheat honeys were specified. I don't have any of those varieties. Can "*table*" honey offer some help. "*Well, that needs more research*" stated one paper. What I was asking was, "*Can the honey in this jar, in my hand, help me with this issue in my throat—right now?*" Quietness and crickets.

I will re-read this piece and I will have it read by objective readers, but I am still afraid my comments will be an unintentional affront to people who are dedicated to medical honey uses. Please keep reading.

In my opinion (which is not fact), honey's beneficial reputation would not have survived this long without a good amount of truthfulness. I do feel that honey will help my throat issues. I do know that honey tastes better than the other cough remedies. I am eating it (taking it?) as I write. But I can only guess if my personal honey is medically valuable for this purpose and if I am taking an appropriate amount and at proper intervals¹.

¹For me only, I found that lightly dipping the handle end of a spoon just barely into the honey and doing this often worked better than taking a full teaspoon occasionally as was sometimes recommended in the literature. An entire teaspoon, at once, bogged me down for a bit. My comments here do not constitute a recommendation.



James E. Tew

Comments I can make with comfort:

1. Honey is not *hurting* my throat
2. Honey may even be *helping* my throat
3. I don't know if my honey is *healing* my throat
4. Finally, I've written enough about this subject – even too much

Some maladies for which honey may be useful²

arthritis

bad breath

bedwetting and frequent urination

burns, cuts, and wounds

cough and asthma

diarrhea and **dysentery**

eczema and dermatitis

hangover relief

hiccups

high blood pressure

jaundice

obesity

sleep disturbance

stomach ulcers

stress

teething pain, in children over a year old

vision problems

vomiting

weakness (*Now that's a broad catchall*)

For the improvisational beekeeper

Queen Cages

Match box queen cages

Said the old beekeeper who was good at giving outdated queen management advice, "Well, I just use a matchbox!" True, classic matchboxes were decent improvised queen cages. But what was once so common is now nearly a novelty. Since matches were needed to fire a smoker, spent matchboxes were frequently in the truck near the defroster windshield vent, in the glovebox, or somewhere around the bee yard environs. Such match boxes were replaced with cheaper folding paper match packs. These folding pack matches were once common freebies, but they, too, are



One of two bee match boxes from Elizabeth's Embellishments³.

now a bit hard to find. Tobacco issues may have pushed this matchbook decline along.

Many years ago, a beautiful idea from the A.I. Root Company was box matches advertising the old *Gleanings in Bee Culture* magazine on one side and a picture of a smoker on the backside that advertised bee equipment. Everything has changed now. These matches, along with the improvised queen cage, are no longer available. I hope Editor Jerry notices this aged idea and reimplements it.

Match box matches are still available on the web. Interestingly, two elegant match box designs with artistic bee motifs are available at: Elizabethsembllishments.com at the web address posted below. (*This comment is not an endorsement.*)

Floral water tube vials as queen cages

My wife and I celebrated our 50th wedding anniversary last year. All my life when flowers were in order, I went for something that *possssibly* would interest a forager bee and would have just a bit – at least. But this wedding anniversary thing required classic flowers – Roses.

Upon acquiring them and moving them to water so they could die more slowly, I noticed that each rose had a tube attached to the bottom of the stem. No doubt the tubes had something other than simple water in them, but that is beyond my interest here. My wife and I removed the tubes. Being a longtime beekeeper, I immediately saw that these tubes could have a second life as a queen holding device or, for that matter, temporarily holding any insect. Funny, you could even use them again for cut flowers.

You can buy them cheaply – by the hundreds on the web. But why do that if you can buy official queen cages by the hundreds at similar prices. Answer. Because it's the principle of the thing. These flower tubes *could*



²Medical News Today (Newsletter) February 14, 2018. <https://www.medicalnewstoday.com/articles/264667>



³Elizabeth's Embellishments. https://www.elizabethsembllishments.com/matches-in-bees-box.html?_vsrefdom=adwords&gclid=Cj0KCQiAkKny-BRDwARIsALtXe7i5TSW-1Ajhp3IJRrQakeORY-MOvZakdBssdrSF8ZPadz_Ni3GEeFZlaAn-wEAL_wcB



A floral tube on the right. The inserted screw is used to show where the stem hole is located.

A queen – apparently scenting – no – queens and drones have no Nasanov gland.



function as queen cages. In my case, I successfully made a dozen red roses relate to beekeeping. This is not totally unlike buying match boxes for no other reason than they have a line drawing of a bee on them. It's the beekeeping principle of the thing.

The Tew Queen Cage – one of the rarest queen cages ever known

Only one ever existed. I used it for years before losing it. A personality flaw of mine, as described by my family, is that I keep anything that could become something else.

For instance, why would I toss short pieces of PVC tubing? At some future time, I will certainly need such short pieces. I devised a simple, made from scrap, one-handed queen cage.

Cut a 2" piece of 3/4" PVC tubing. Glue fiberglass screening on one end. For direct queen access, I put a shallow saw kerf across the tube that barely opened to inside. I am not sure this was required. Put a PVC cap on the other end. That's it. If desired, a clump of sugar candy would be used to plug the open end, but I never used that. This one-handed cage worked great when luckily finding a swarm queen, grabbing her and dropping her into the big-mouthed cage opening.

When using the cage for introducing a queen into the colony, it presented the usual problems of where and how to temporarily position it into the colony. Why not just use traditional queen cages? Well, where is the creativity in that. It's like using floral tubes as cages – it's the principle of the thing. You took scrap and made something useful for beekeeping.⁴

A retraction

I have written hundreds of articles. This feat does not make it great but does indicate a significant degree of obstinance. I screwed up in a previous article. Either you were kind and you let me escape or you missed it. This amounts to a tempest in a BC back issue and should most likely be left alone, but I was wrong, and it is out there somewhere in the bee literature.

In my July, 2018, article⁵, I presented a photo that I had taken showing what I incorrectly referred to as the queen's Nasanov gland. At the time, I had a foggy thought that I had never really considered that gland on the queen or on drones. In my defense, I had a nagging thought at the time that this event had a peculiar taste. But there was the queen with her (apparently) gland was exposed – in full HD format. Pictures don't lie. So, Into the article it went.

I can promise you this:

1. The abdomen in question is on a queen. No doubt. I can distinguish a queen from her workers. She was marked, calm, and regal. I harassed her to get just the perfect shot. She began to run. Apparently, at this point, she was hiding and apparently scenting.
2. She held this position for a long minute – maybe more. I could argue that this position was not an accident. I finally disturbed her to get a better shot, but she crossed the top bar that is just out of my enlargement. The photo moment passed.
3. The bee literature is replete with citations indicating queens and drones have no scent glands. I am not challenging that concept with this one photo.
4. I cannot explain why this queen kept that intersegmental membrane exposed so long. It looks like she is scenting. She is not. I have an eggy face, but I wanted to be honest.
5. I'm left with the question, "Why don't queens and drones have Nasanov glands?"

I'm done for this month. I am late and BC editorial staff are becoming pushy – as they must do about every month. Thanks for reading and I do not mean that "thank you" whimsically.

Please visit me again next month. Until then, Jim **BC**

Dr. James E. Tew, Emeritus Faculty, Entomology, The Ohio State University and One Tew Bee, LLC; tewbee2@gmail.com; <http://www.onetew.com>; <https://youtu.be/s0Zzn1oEhU>



<https://youtu.be/lijoaHeTsSY>

⁴The cage did work and was actually useful in some instances, but you do realize that my aggrandizement of this trinket is presented a bit of tongue-in-cheek attitude.

⁵I wrote the article in July, 2018. It must have come out in the August 2018 issue, which oddly is not presented in the *Bee Culture's* back articles.

Bee Hunting In Highlands Of Scotland

Curious To Find The Home Nests

Ann **Chilcott**

This article is about a successful hunt for a wild colony of honey bees during the Winter of 2019 in the Highlands of Scotland. I live in the hamlet of Piperhill, which nestles in the county of Nairnshire and lies about 15 miles east of Inverness, the capital city of the Highlands. Up here, we're at about the same latitude as Moscow but it isn't as cold and snowy here as there because we are close to the sea. Still, winters in northern Scotland can seem very long for a beekeeper itching to start the new season. Most of us miss the contact with our bees and we love it when we see them foraging in good weather. Early February 2019, was typical; we experienced two weeks of sub-freezing temperatures.

The weather is changeable though, and the second half of February 2019 was exceptionally warm. A few miles away on the 17th, a friend reported 59°F (15°C) and that day I spotted a butterfly feeding on the sweet box tree, *Boxus sempervirens*, by my doorstep. The bees were out among crocuses and snowdrops, and I spotted a dandelion opening to the sun. A song thrush, *Turdus philmelos*, sang, and blackbirds, *Turdus merula*, were mating, which didn't bode well for them. Raising families long before the reliably warmer days of Spring is risky.

On February 20th, it was cooler, but still mild at around 50°F (10°C) during the day. For exercise and the love of outdoors, I walk whenever I can. This day, I set off on the familiar five-mile circuit that takes me from my doorstep, southward to a crossroads, through parts of Cawdor Woods, and up past fields devoted to a rotational crop growing system. This year, barley, used to make whisky, was grown, but next year oil seed rape or wheat may be cultivated. I walked past many more fields and several farms before arriving back in Piperhill at the opposite end from where I live. Throughout my hike, I walked briskly but was able to study nature along the way. About a mile from home, I heard the sound of a honey bee flying and then landing. It stopped me in my tracks, and I peered around to see where the bee had settled. I spotted her standing motionless on damp grass at the roadside, and I could see that she was drinking water on the surface of "her" blade of grass. I marvelled at her busyness on this winter's day, and waited to watch the



Me (left) and my sister Catriona (right) beside the bee tree.
Photograph by Linton Chilcott.

direction she would take to fly off home bearing her load of water. Alas, I lost sight of her as soon as she flew away.

I was very excited because I suspected that this bee was probably from a wild colony. I knew that there were several managed colonies within a six-mile radius but I also knew that water collection in winter can be an energetically costly job for honey bees so they usually visit water sources near their nests (1). Water is required in large volumes once the queen starts laying again after the Winter solstice. This is because the nurse bees need water to produce the watery, but protein-rich, brood food for the developing larvae. Water may also be needed by bees in Winter to maintain their osmotic balance while feeding on honey, which is an 82% sugar solution. They need to dilute the honey they eat. Some of their water is recycled inside the hive from condensation, but evidently, they sometimes need more water, so they fly out and fetch it from wet spots. From a small study that I conducted in my apiary (2), I know that my bees will fly out to collect



The grassy roadside where I first spotted the first water collector on February 20th.

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water in winter when the air temperature is only just above 40°F (4°C). This can be chilly work; I've watched them on the edge of the water dish warming their flight muscles before take-off to fly home.

Curious to find the home nest of my water collector, I returned on the next warm afternoon (February 23rd) with my great friend Patricia O'Dwyer who was visiting from Cork in southern Ireland. Not finding any honey bees at the original site, we walked further along the road and searched near some gorse, *Ulex europaeus*, bushes a few feet from the roadside. Gorse is nearly always in bloom and so I wondered if they might just be collecting pollen that day. By the way, regarding gorse, there is a saying over here, "love is out of fashion when gorse is out of bloom." The air was still, so it was easy to hear the familiar sound of flying bees. It didn't take us long to spot two honey bees on wet grass close to gorse and I attempted to catch one in my bee hunting box. This was the first time that I had used the box and clearly, I needed a lot more practice. It was unsuccessful because I'd terminally maimed the poor bee by snapping the door shut on her. However, I tried again and captured the second bee intact. After several minutes feeding on a square of comb filled with sugar water she was released. We could see that she flew off to the north into woodlands, but we couldn't be sure to which side of the road she went. By this time, it was late in the day and getting-cold, and she didn't return.

It was also too cold over the next couple of days to do any serious bee hunting, but the weather on February 26th looked promising, and the bees from the home apiary were flying, so I made plans to search hard for the wild colony's nest. I gathered together my bee hunting kit which includes a copy of "Following the Wild Bees" (3), and I invited a team to help me. These investigative expeditions are much more fun, and also easier, with a few friends to help search for the bees' home in the woods.

With my husband Linton and sister Catriona, I set off for the place where I'd first found the water collector bee. My plan was to capture bees from the grass in my black-walnut bee box from the Hudson Valley Bee Supply. I would load up a small square of old brown comb filled with star anise (*Illicium verum*) scented sugar syrup and place it inside the box for the captured bees to feast on. Once they had filled up, I would release the bees and watch carefully the direction of their flights home to get a compass bearing of their "bee line." I would then mark



. Aerial view showing the path of my southward walk when I discovered the first water collector (yellow dots), the spot where I first observed a water collector and where I later set up my bee hunting station (blue dot), and the bee tree (white X). Google Earth photo provided by T. D. Seeley.

with paint, using different colors, some of the bees and time how long it took them to fly home and return to the comb (i.e., their "away times"). Knowing this, I would estimate the distance to their nest. Then I would capture in the box some of the returning marked bees and move them down the bee line in stages until I discovered their nest.

This was the plan, but it was not what actually happened. Linton accidentally knocked over the precariously balanced sugar syrup bottle whose contents splattered out covering my face, hair, and hands, and caused great excitement amongst the bees. They must have thought it was Christmas given the lack of nectar available at that time of year. They loaded up and rushed back home to share with their sisters the good news. Soon lots of bees were landing on me and the mossy, and now syrupy, stone wall. There was a feeding frenzy on. So, I marked them as they landed, and tipped the remaining syrup onto the mossy wall.

I was so absorbed marking bees that I forget to look up to see where they were flying, but Catriona had watched some fly off and shouted excitedly. I stood up to pay attention looking west over a stubble field in the direction of Cawdor Woods where Catriona saw them go. I followed the direction of a bee that flew west for a few feet then suddenly took a sharp right turn in a dog leg to fly north. Just at the moment of my noting the direction, I noticed Linton waving enthusiastically from beside a tall larch tree that is about 100 yards away, and just a few feet from the stone wall that edges the field. He had found the bee tree while examining potential trees close by. This great larch, *Larix europaea*, with a split up its south side, had initially aroused Linton's curiosity and he thought it might provide a good cavity for a honey bee nest. On examining the front, he found the heavily propolised entrance to our wild bee nest and a lot of bee traffic. You can see the copious quantities of propolis coating the entrance which implies that this nest site has been used over a number of years, though not necessarily continuously.

Since finding this bee tree, I consulted with the head



My bee box with comb loaded with sugar syrup, being visited by dark bees from the wild colony. Author photograph.

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Labelling a bee as she loads up on sugar syrup on my hand.
Photograph by Linton Chilcott.



Bee loading up on sugar syrup sprinkled on moss.
Author photograph.



Bees entering the bee tree bearing loads yellow gorse (*Ulex europaeus*) pollen. Photograph by Linton Chilcott.

forester for Cawdor Estates, on which the bee tree lives, and I put up a bait hive to offer a good home to a swarm that might come to this hive. The larch tree is unhealthy having probably suffered a lightning strike some years ago and it is thought that it may come down in a storm, so it would be good to be able to find out just how these bees are coping with varroa and to learn about their genetic origins. If the bees swarmed, they didn't use the bait hive this year though I saw scout bees investigating it several times when I visited over the summer. The bees were still flying to and from this bee tree in early November 2019 and I hope they will survive winter.

Why this find is so exciting is that it is a widely held belief in the UK that wild colonies of honey bees have not survived due to varroa which came to Scotland in the 1990s. It is now known, through extensive research, that wild colonies of honey bees in the Arnot Forest in New York State (USA) have survived and evolved to cope with varroa. This is also the case for wild colonies in some European forests, so why not in Scottish forests and woodlands? More research is required to investigate the situation further and I intend to hone my bee hunting skills and get out there searching again next season. **BC**

Ann Chilcott, Scottish Expert Beemaster, is a writer, mentor, and teacher of beekeeping in Scotland. Email address: ann@chilcott.myzen.co.uk. Website: Beelistener.co.uk

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What Is COLOSS?

Joanna Collin



Veto-Pharma VP Joanna Collin was kind enough to share an interview with Geoff Williams, Auburn Univ. and now Co-Vice president of COLOSS the international association focused on improving honey bee health on a Global level. Jerry

Meeting with Geoff Williams, Co-Vice President for the COLOSS network

We are keen to introduce you to the COLOSS network, of which we have been a partner since 2017. COLOSS's mission is to promote the health of honey bees worldwide. They do this by coordinating international research, as well as disseminating knowledge and education. COLOSS projects are recognized worldwide and unanimously praised by the beekeeping community.

Hi Geoff! Can you introduce yourself in a few words? How did you get into entomology and research on honey bees?

Sure! Thanks so much for your interest in me, and more importantly, COLOSS! Like a lot of people, the job I have today is nothing like what I imagined it would be when I was growing up. It actually wasn't until my graduate degree that I first was exposed, and then really interested, in honey bees. During my undergraduate studies, I really enjoyed taking entomology and parasitology classes, and as you can imagine, working on honey bee health is a nice merger of the two disciplines! I had an opportunity to work on honey bees during my Master's degree. I took that opportunity, and haven't looked back!

What is COLOSS, when and why was it created?

COLOSS was established in late 2008 as EU COST Action. The intention of that funding source was to provide interdisciplinary networking opportunities for modern day scientific challenges. In our case, the challenge was a reduction of honey bee health in many parts of Europe. During that project period, anyone on the planet could have participated in COLOSS events, but there was a clear priority to financially support European researchers, students, and other scientific stakeholders. Once COST support ended in 2012, as mandated by its funding program, we sought to continue what we had built by creating a non-profit organization. Today, we have over 1,300 members from all 6 honey bee-inhabited continents, and our membership is open to anyone from the scientific community that has passion to promote honey bee health.





Attendants of our 2019 COLOSS conference in Montreal, Canada. Photo by Norman Carreck

What are COLOSS' principal fields of action/research?

As you can imagine with so many members, COLOSS is blessed with expertise in topics ranging from honey bee husbandry, to honey bee parasitology, to honey bee breeding, to honey bee toxicology. As a result, we are arranged into several 'Task Forces', each focused on a specific topic that we as a whole believe is important to honey bee health. For example, one of our Task Forces deals with pesticide exposure, while another targets *Varroa* mite management. Every year, each Task Force organizes a meeting to bring together any scientific stakeholder interested to work on common projects. Additionally, we bring together all Task Forces once per year at our annual conference, which is usually hosted immediately prior to EURBEE or Apimondia.

How did you get into the COLOSS organization? What is your role in this network and how much of your time does it usually take?

I was originally brought on in 2011 as a kind of part-time Executive Director, to coordinate overall effects. Most of my work involved communicating with local organizers who were arranging Task Force meetings around Europe. Today, I am one of 15 Executive Committee members of COLOSS, and am also Co-Vice

President with Panuwan Chantawannakul of Thailand. I spend most of my time again acting as a liaison between the Executive Committee and local organizers, and I also co-coordinate our annual conference with several other Executive Committee members. Particularly prior to the annual conference, COLOSS can take up nearly all my time. But usually I spend 4-6 hours per month working on COLOSS activities.

What happens at the COLOSS workshops and conferences?

Coordination of our activities best occurs in person, at meetings. Specific Task Force workshops generally focus on identifying, developing, and finalizing topic-specific projects. For example, the toxicology group – Apitox – might coordinate the development of standard risk assessment laboratory procedures. The conference on the other hand provides a venue for each Task Force to provide updates to the entire group, as well as where our membership can make important strategic and financial decisions for the future. Of course, because we are science nerds who love talking about honey bees, we also provide time for each Task Force to get together to discuss their specific scientific work.



President Peter Neumann addressing the COLOSS General Assembly.



Karen Rennich and Nathalie Steinhauer introduce COLOSS to the Bee Informed Partnership. Photo by P. Chantawannakul.

What is the role of sponsors (ie Vêto-pharma) in the organization?


Since our COST Action ended, COLOSS as a non-profit has heavily relied on financial support from stakeholders of the honey bee industry to perform its activities. This support usually comes in two forms – the first is event-specific sponsorships that may be provided by local universities and beekeeping clubs, and in the case of our conference, from the Eva Crane Trust. The second is network sponsorship provided by Vêto-pharma and the Ricola Foundation. This level of support affords us with a peace of mind and ability to sustainably plan and organize our approximately 10 events per year. It also allows us to maintain our website, which disseminates honey bee health knowledge and provides an e-platform for event organization. We try to be as inclusive as possible for all our membership; one way we do this is by maintaining low registration fees to our events. Therefore, financial support from our stakeholders is paramount!

What projects are you looking forward to? How do you see the COLOSS network in a few years?


During my time with COLOSS, I have really seen it

grow from a European-centric organization to one that entices stakeholders from across the planet. In the past two years, I have been especially excited to see a workshop and an annual conference being hosted outside Europe for the first time. The latter event in Canada even broke a COLOSS attendance record! Coming up will be our first event in Asia. There we hope to network with our Asia counterparts, kick off a new version of our BEEBOOK, and host a scientist-beekeeper discussion day! I think these activities represent where we are headed – more inclusion across the planet, and a tighter connection with our second most important stakeholder – the beekeeper. If it’s not obvious, clearly our number one stakeholder is the honey bee! **BC**

Thank you Geoff for giving us this view on the COLOSS activities and sharing your vision for the next few years’ activities! The actions of COLOSS are vital for the honey bee’s future, and we really care about sharing their activities with you all. We invite you to follow their activities and give them more visibility to contribute to the accomplishment of their projects! For more information: <https://coloss.org>



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KIM FLOTTUM

In Business with Bees



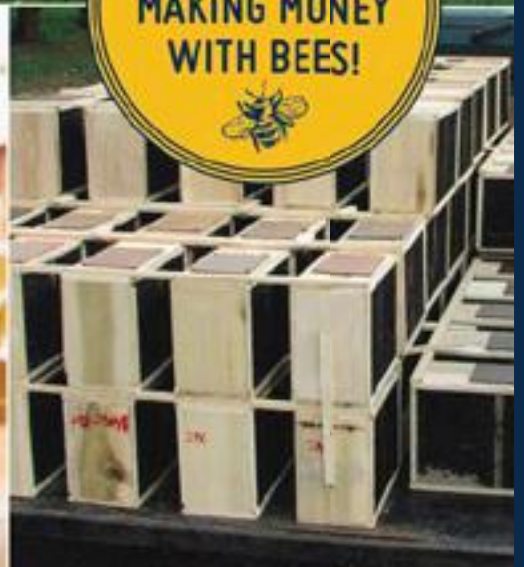
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BUILD THIS CHEAP AND EASY STORAGE CONTAINER

Ed Simon

Regardless of the number of honey storage containers you have, you are always one short. Not having enough easily emptied containers is a pain in the neck. Building this cheap and easily emptied storage container with a spout or drain is extremely easy to do with minimal cost and effort.

Parts

- 1) Five-gallon pail.
(For honey use food safe pails.)
- 2) Drain valve 1/2" – Brass valve.
(Watts – LFFBV-3C-M1 - Brass full port valve) or
(Everbuilt 869 340)
- 3) 1/2" x CL conduit nipple.
- 4) 1/2" Conduit locknut (2)
- 5) 90° PVC Elbow (optional)
- 6) Epoxy
(J-B Weld - WaterWeld epoxy)
- 7) Thread seal tape (Teflon tape)

Terms

- Valve – Plumbing term for a unit that stops the flow of a liquid in a pipe.



- Full port – A feature of a valve that defines the size of the hole inside the valve.

A full port valve has greater flow capabilities than a non-full port of the same diameter.

- Nipple – A pipe that is threaded at both ends. Usually a shorter pipe.
- CL – Close – When the threads on both ends of the nipple meet in the center of the pipe. There is a very narrow non-threaded section of the pipe separating these threads.
- Conduit – Electrical term for a pipe that is used for holding wires.

Construction

Five-gallon pails are used because of their availability and cost.

A hole is drilled into the side of the pail and then a spout (drain valve) is attached using quick hardening epoxy.

Note: For honey storage, the pail should be made of "Food Safe" plastic

Step 1: Locate the best position for the drain valve.

The location of the drain valve (part 2) can make the pail easier to carry and empty. The drain location works best when the drain, which sticks out, doesn't hit your body when you are carrying the pail. Equal distance between the handle hinges seems to work best for both carrying and pouring. You decide what is best for you. The vertical distance from the bottom of the pail should be as close to the bottom of the pail as possible and still allow you to put a locknut (part 4) on the conduit nipple (part 3).

Step 2: Size the drill bit.

Use a piece of scrap wood to test the size of the bit you are using for

the drain hole. The conduit nipple (part 3) should be able to be force-screwed into the hole.

Note: For a 1/2" valve the hole opening is usually 3/4".

Step 3: Drill a hole in the pail.

Drill a small pilot hole in the pail where you decided to locate the drain. Drilling a pilot hole stops the larger drill bit from wandering around the pail surface and making a hole in the wrong place. Then use the drill bit you decided on to enlarge/drill the final drain hole.



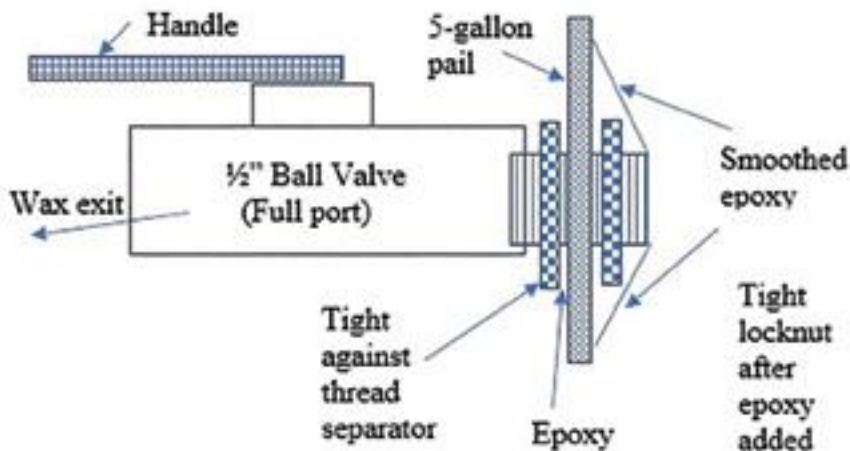
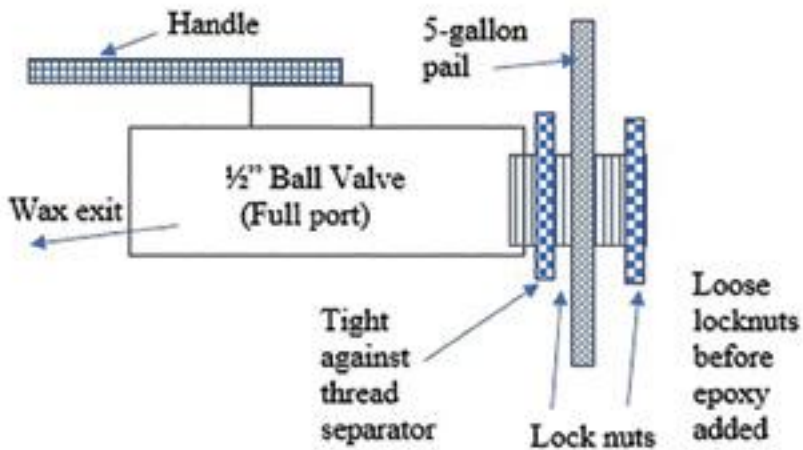
Step 4: Dress the hole.

Use a utility knife and sandpaper to clean the burrs from the drain hole.

Step 5: Build the drain assembly and fit it into the drain hole.

Use thread seal tape (part 7) to assemble the drain valve (part 2), the conduit (part 3). Then add the outside locknut (part 4) to the opposite end of the conduit nipple. Seat the locknut firmly against the conduit thread separator. Using this assembly, force the conduit to thread itself into the drain hole. Then add the inside locknut to the drain assembly. Tighten the inside locknut just enough that it will stay on the assembly. Then screw or unscrew the drain assembly so the space between the pail and the locknuts is equal distance.

Note: The valve (part 2) was used to provide leverage to force the assembly into the pail.



Warning: Do not get epoxy inside the conduit nipple. It will be almost impossible to get it out once it cures.

Hint: Stuff the conduit nipple with paper towel before adding the epoxy. Make it tight enough so any loose epoxy will not get into the opening.

Step 7: Water test.

Make sure the drain valve is in the OFF position and then add water to the pail and look for leaks. Fix any leaks that show up.

Usage

This pail can hold any liquid. The drain valve with a handle allows for control of the flow rate. Replacing the drain valve with a different style is easy. You can even replace the valve with a “CAP” to completely seal the pail. By adding an elbow (part 5) you can redirect the flow any way you want.

Conclusion

Easy to make, easy to use and easy to clean, this pail will provide some flexibility for the handling all kinds of liquids. The use of the conduit in the valve assembly allows you to change the valve depending on the function you are planning to use the pail for. **BC**

Rational: By using thread seal tape and a separate conduit, the drain valve can be changed without affecting the pail integrity

Note: Be sure the locking protrusions on the locknuts are facing the pail side. These locknuts help stabilize the drain.

Step 6: Seal the outside of the conduit nipple.

Follow the directions on the epoxy (part 6) to activate it. Make a small rope of the epoxy and force it into the threads of the conduit nipple (part 3) between the outside locknut and the pail. Then use the drain valve to tighten the drain assembly into the pail. **Do not** force all the epoxy out of its sealing location. Align the drain valve so it is easy for you to operate. Smooth the epoxy and allow the epoxy to cure before sealing the inside of the drain assembly.

Warning: The working time of the epoxy is very short so do not dawdle.

Hint: Wrap electrical tape

around the conduit threads between the outside locknut and the drain valve to protect them from stray epoxy.

Step 7: Seal the inside of the conduit nipple

Perform the same epoxy sealing operation on the inside of the pail. Tighten the inside locknut, this time leaving a ring of epoxy between the locknut and the pail. Smooth the epoxy around the nut and over the inside threads that are exposed and allow it to cure.



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.

In 200 hundred years, if people haven't blown each other to smithereens and robots, aliens, or fire ants have yet to conquer the world, future humans will watch virtual reality documentaries on all of us – well, maybe not each of us individually but representative versions of all of us, like famous rich people. Future documentaries will say, "Way back then, people still had to talk instead of wirelessly transmitting brain waves. Furthermore, ancient people spent hours of their primitive lives in things called cars – crude transportation machines – instead of merely teleporting. At one time, our inefficient ancestors even had to utter a series of words, called 'directions,' to describe how to arrive at places in their unsophisticated cars. Directions, what a waste of seconds!"

Having long been unsophisticated, yet skilled at wasting time, I'm ashamed to say I once enjoyed the seconds spent giving and receiving directions. But recently watching a young man try to transmit knowledge on routes and whereabouts thankfully broke me of that guilty pleasure. It was a sad, sad sight to see a full grown adult at a complete loss to describe the location of his domicile. This man wanted to know if my hives were close enough to his residence to be considered "local," so I asked where he lived.

"In an apartment building."

"Where at?"

"I think it's near a bridge."

"Is there water under the bridge, or train tracks, or another road?"

"I think water, a blue line is on the Google map."

"You mean a creek."

"Here, let me just show you the map on my phone."

Call me old-fashioned, but I miss the primitive days when people knew where they lived and could tell you how to get there. Sometimes I even feel guilty marketing local honey to people who don't know their locality. I worry these people may make a wrong turn on their way home and drive into a ditch or get stranded in a dark wood without cell phone reception. A helpless person with a jar of local honey would be too much temptation for a local bear to resist.

Some people get flustered when asked for directions, especially nowadays when talking to strangers is taboo. But giving directions need not be scary. Clear directions start with an acknowledgement of a major landmark,

like a school, church, or water tower. From that point, a properly-identified road goes north, south, east, or west for a certain number of miles to a left or right turn onto another properly-identified road. This second properly-identified road can lead to a third, fourth, fifth, and so on until the final destination is reached. Interspersed in the enumeration of roads, miles, and turns should be descriptive landmarks, like an old forked pine, 12ft bent red gate, haunted cemetery, etc. Avoid using landmarks such as cow pastures because the livestock could be grazing out of sight and most modern adults, so far removed from their childhood farm animal books, second guess the identification of livestock.

Receiving directions requires active listening. The best receivers repeat the directions back to the giver a few times in feigned confidence. Psychologists believe this facade of sureness, especially with nodding and hand gesturing, helps retain the directions in the subconscious, from which they arise in confused bits and pieces on route to the destination. Ornithologists also observe this nodding behavior in migratory birds receiving directions before take off.

Speaking of birds and directions, one day my friend and old coot Tightwood touted himself as a man with a "good sense of direction." As such, he also thought directions were a waste of time. This declaration occurred while Tightwood was loading my truck to go catch a swarm at the Greene Farm. While I was on the phone with Mrs. Greene, Tightwood was waving me off, mouthing "I know how to get there, ain't no need to waste time with directions."

"We'll be there in about 45 minutes," I told Mrs. Greene, feigning confidence.

"Thirty minutes!" Tightwood barked as I hung up the phone. "My deddy sold them cows. It's up near Polkville. I'll remember the exact whereabouts when we get up there--I've got a good sense of direction."

"--the direction of a police bloodhound," I said. "It always leads to a dead end with a criminal-looking hideout."

"You've got to admit that last biker gang was really friendly."

"Yeah, after they stopped and frisked us."

Indeed, Tightwood's fatal flaw in direction receiving was not lack of feigned confidence, but authentic overconfidence. On the unlucky occasion, for both of us,

Receiving

that Tightwood lost paper-rock-scissors and had to ask directions, he always did a slipshod job, merely asking the person to “point us in the right direction.” If the person tried to add more detail, Tightwood would refuse these specifics and say, “All I need is to get to...” Sometimes he would even argue with the person, “Oh no, there’s got to be a faster way to than that--I remember a side road up ahead. Thanks anyway.”

After the biker incident, I should have known better than to trust Tightwood’s sense of direction with a time-sensitive swarm. Mrs. Greene said this swarm was as big as a basketball and hanging, ripe for the picking, in a little dogwood tree. It wasn’t long till Tightwood’s sense of direction was faltering:

“That house looks familiar,” Tightwood said, “Slow down. We’ve got to be getting close.”

“Ugh! the road looped around. We passed that house five minutes ago. That’s why it looks familiar.”

“Simmer down, this dirt road here looks familiar. I distinctly remember they lived on a dirt road.”

“Didn’t everybody live on a dirt road back then?”

“This is it. This is the road. Turn here.”

The dirt driveway, if you can call it that, was not maintained at all, and I was already mentally calculating the cost of my tire realignment and back adjustment. But Tightwood thought the remnants of a barb-wire fence were a good sign. I had the feeling that this wasn’t the type of place the nice sounding lady on the phone would inhabit. Further cause for concern, a scraggly cherry in the old fenceline was adorned with a sign that said “Trespassers will be shot.” On seeing that, Tightwood began to show a little hesitation, saying, “Hmm, I don’t think the Greene’s would have left a cherry in the fenceline – that could kill a cow.”

“It’s not a cow I’m worried about,” I muttered, as we finally arrived at a farmhouse that would have been considered old 50 years ago.

“Yep, they lived in an old farmhouse,” Tightwood said.

“Do you remember a big German Shepherd and whether or not it bites?” I asked as the dog paused from barking to sniff my door. Thankfully, the dog seemed rather fascinated with the smell. I told Tightwood I would keep the German Shepherd distracted from inside the car, as he went to knock. But before Tightwood could reach the porch, an unkempt burly man with a 20 gauge opened the door. Much to my dismay, the man appeared to take

Tightwood hostage, motioning him inside with the shotgun and then closing the door. After 10 minutes of listening to the German Shepherd bark while contemplating whether Tightwood was worth a rescue attempt, I had decided it was my moral obligation. I planned to throw a Slim Jim out the window to distract the dog and then bum-rush front door armed with my hive tool. I was counting down from 10 to start the extrication when the burly man thankfully came to his senses and released Tightwood who strolled up to the truck with a big grin.

“I told you this looked familiar,” he said. “That was Wayne Morgan. My deddy and his traded on a couple of heifers back when we were kids – that’s why I remember this place. He pointed me in the right direction to the Greene farm. It’s about five minutes over yonder.”

When we arrived over yonder, Tightwood said the Greene farm looked just as he remembered. Mrs. Greene was out in the yard.

“How are yall?” she said, “I thought yall were supposed to be here two hours ago.”

“We got a little sidetracked and turned around,” I apologized.

“Well, yall are five minutes too late. That swarm just took off in a big whirlwind and headed over the trees toward the old Morgan place.

“Wayne Morgan?”

“Yes sir, I can give you directions, but he’s a bit peculiar about strangers wandering up on his property.

“No mam,” I said, “directions won’t be necessary. Him and Tightwood are old friends, and I’m well acquainted with his dog.”

Mrs. Greene wished us good luck.

Although surprised to see us again, Wayne Morgan was certainly nice. He even let Tightwood borrow his 20 gauge to shoot down, if needed, the swarm from a treetop. Alas, it was not to be. If only I had wasted a few seconds and gotten directions over the phone initially from Mrs. Greene instead of trusting Tightwood’s good sense of direction, I wouldn’t have lost a swarm and wasted a whole afternoon and evening at Wayne Morgan’s. Still, it wasn’t a total loss: Tightwood bagged three squirrels to fry up for supper with Wayne Morgan, during which I bonded with a German Shepherd over a Slim Jim. **BC**

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BIGGER PICTURE

Jessica Louque

The History Of Kim Flottum (in my life)

When I first started college, I was pretty excited because I was a nerd who liked school. Maybe not the “useless math” parts like calculus and DiffEq, or physics, but I love science and languages and have an unhealthy obsession with books in general. After attending college, I was a little irritated that I ended up spending so much money to be “well rounded” and take classes that had no relevance to what I wanted to do. What I realized later is that college is basically a base understanding of the “starter pack” on your major, and a bunch of other stuff to prove that you can get through a bunch of garbage and be responsible enough to graduate. The real importance of college was networking and learning how to find the people or places that have the information you need.

Once I started working as a managerial position that interviewed people, I realized that resumes really don't tell you the ability of a person to do a job, and I tended to lean towards NC State, and I tried so hard to be biased against UNC, but some of my favorite people hired came from there, although so did the absolute worst person I've ever hired. The point is, college itself doesn't really guarantee you a job. It's the people you meet and the outside of class things you learn that help longer.

If somebody called to say they knew someone who was looking for a job, and I respected the person calling, there's a pretty good chance I'd find a place for whoever they vouched for. At the same time, the first career job I had was through an alumnus that had my same major advisor in undergrad and it started as a temporary position. I would have never even heard of the job if it hadn't

been for them. I needed *Aspergillus* one time for a project, and I called up the head of the department to ask for help and there she was, with a culture in the back room. You don't have to have all the answers, but it definitely pays to know how to find the people who do. The person who excels at any job, no matter the sector, is the person who can problem



solve consistently and efficiently. A lot of other inadequacies can be overlooked if you're the person who always “has a guy” to call that reliably fixes the problem at hand.

I started working in honey bees as a career in 2010. To be perfectly honest, I can't remember the exact catalyst that brought me to Kim Flottum. I do remember his name popping up, and I've never had a problem emailing people who post their contact information if they knew something I wanted to know. Somehow, I ended up talking to Kim, and it turned into me writing

for *Bee Culture*. I think the first time I met Kim in person was at EAS in Rhode Island in 2011, as a speaker. Originally I think Dick Rogers signed me up but then couldn't make it, so I did my first regional presentation on how we test pesticides for honey bee effects. I was initially surprised that I don't have a photo with Kim from this one, but then I remember that I could probably find a Chupacabra in Ireland sitting still easier than holding down Kim for a photo at EAS.

If you've been a reader for a long time, you may remember back in my beginnings, there was a tattoo edition. I met Kim with Kodua Galieti in Fresno during Almond blossom in late February of 2012, as we both travel to strange places when the bees take us there. We met at the Blossom Trail café, just outside of Sanger in the intersection of peach and plum trees as far as the eye could see. Kim was in town for his almond odyssey and Kodua was a photographer. I had been in California for a decent amount of time working on a bee study in almonds, and I was a day off of getting my second California honey bee tattoo, which was an almond blossom with a honey bee. I was showing Kim and Kodua my last tattoo, and started pitching the idea. Beekeepers are a little more conservative than my normal life, but the tattoo culture seeps in to a lot of places and I think Kim agreed it would resonate with some of his younger readers. I can't remember if I had a full thigh anatomically labeled bee by the time the tattoo edition was published, but I learned that round body parts don't photograph flat well for magazines (sadly). I also remember Kim giving me names of some local commercial beekeepers and other people that could be really interesting to pass my time between bees while I was there. I think I



Kim and Jessica in California in 2012.

met at least five people that I kept in long-term contact with for larger beekeeping operations, and I would have never even known their names without Kim. I won't list their names here, just to keep Kim safe since I did spend a lot of time hunting these people down and they might not have been quite as appreciative of my constant questions and texts and visits (although they hid it well if they minded).

Once I started writing for the magazine, it seemed to fill a niche to write about the outside world as it pertained to beekeeping. Beekeepers so fascinated with their bees that they had them tattooed on their bodies seemed like a good start. In the meantime, my job

confidentiality prohibited me from writing about the most interesting stuff in my life related to bees, but there was enough going on to keep the articles full each month. Most of my hobbies, like homesteading, gardening, domesticated birds, etc., resonated with a lot of beekeepers because they did the same things. Kim was on board but he also liked to throw in more of the research aspects occasionally. I also am a vague person by nature. I don't always buy into the feminism thing, but even when I was little, I assumed if I had learned it, then everybody else already knew it. Being in bees, I just assumed everyone knew all the things about bees, and also knew about contract research organizations and



Kim, Kodua Galieti and Jessica in California, 2012.

how pesticides were tested on bees. I also knew if I got too into it, I talked too much and I didn't want to lose my career.

I ran into Kim again in person after having him as an editor for a couple years at the grand opening of the Bayer Bee Care Center in April 2014. It was a kind of last minute thing, and of course I had him and Kathy pose for a selfie with me and Bobby. It was one of those "what are you doing here?" moments, but I did a lot of work for Bayer and I respected Dick Rogers as one of my bee mentors, who was their main bee spokesperson, and I got along with most of their bee teams people pretty well on a friendly basis. I don't know why I was surprised to see Kim, since he knows everyone and everything that goes on in the bee world. Somehow in that 15 minutes, he talked me into driving to Lexington for the EAS meeting in Kentucky that Summer and Bobby and I drove up for a quick round trip. Most of the bee meetings are in our busiest season, making attendance difficult. It's a hard thing to turn down Kim though, I'll tell you that.

To guarantee seeing Kim, all you have to do is head to an ABF meeting in January. Via Kathy, I think a few of us took the time to meet up at the ABF in Galveston in 2017 (was the prior on in 2011? I got a honey bee tattoo at that one too). Bobby and I went out to lunch with him and some of the other *Bee Culture* family, proving that you have to make Kim sit down at a conference to get him to hold still for a photo. It was during this time that the plan for *Voices of Bee Culture* started going through Kim's mind... although I am inclined to think that sometimes Kim has a book of ideas in his head and waits for the opportune moment to spring them on his "subjects" when he thinks they are most likely to say yes. I think it was Kim and Kathy, Kim L, and Jean at the table. We were finally having some of our bigger studies move through the EPA, and Kim really wanted more focus on the "other" side of what I did to come in my writing. Not that the homesteader part isn't fun, but the pesticide research is the part people want to hear. Well, they want to hear it if it agrees with what they think. All you need is the internet now and everybody thinks they're an expert.

Kim flew us into Medina in September of 2017, where I learned the important lesson of how to pronounce “Medina”. Being from a place that marks outsiders instantly by mispronunciation of the name, I completely understood how important it was to say Muh-DI-nah instead of Me-DEE-nuh. Somehow, I missed another photo opportunity with Kim, leading me to believe I need to be much more aggressive hunting people down with cameras at events. I think this presentation might have been the first time I really explained what I did, and Kim really wanted a few columns about it. I have some pretty strong opinions as it is, especially being a country farm kid, and decided to go for it. A couple months later, Kim is telling me maybe I should take a month off so they can clear out the mailboxes since they’re getting so much feedback from my column (both bad and good, but the bad always sticks to the wall better). By now, we’ve kind of settled into a rhythm of writing about whatever comes up in bee relatedness monthly and trying to intersperse hot button topics with more practical or mundane aspects of a beekeeper’s life.

Left to right – Kim, Kathy, Jean Newcombe of Bee Culture, Kim Lehman, Bobby and Jessica Louque, in Galveston in 2017 at the ABF meeting.



Throughout the years, Kim has been a wealth of knowledge, resources, and experience. There are very few individuals in this world that I feel like make my life better for being a part of it, but Kim is definitely one of those people. A short article in a magazine truly can’t begin to describe the impact Kim has had on my personal life and professional career, but I think it should be said that he is definitely a benefit to have on your side. I have always enjoyed my time working with the entire *Bee Culture* family with Kim at the captain’s

place, and now I hold him responsible for making sure Jerry takes over the crew as easily as possible. It would be hard to get a more diverse group of people, personality-wise, in one place but Kim makes it look easy to deal with us all and keep us happy. I’m just hoping now, with him having a little time off and a step back, I can do a better job getting him in some more selfies at meetings. **BC**

Jessica Louque and husband, Bobby raise bees, kids, and animals and run a business from their home in North Carolina.

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PROTECTING OHIO FROM THE GYPSY MOTH

Barb Bloetscher and David Adkins

Soon, overwintering gypsy moth (*Lymantria dispar*) eggs will be hatching, and management of this non-native highly destructive pest will begin by the Ohio Department of Agriculture (ODA) Gypsy Moth Program. Every year ODA receives emails and calls of concern that the treatments may affect honey bees, butterflies and other pollinators. A great deal of research has been conducted by universities, USDA, and private organizations to determine the safety of the products used, and the techniques deployed to minimize effects on humans, pets, plants, birds, insects, fish and other organisms. The U.S. Forest Service has done Environmental Impact Statements in 1995 and 2012 which confirm that the program followed by ODA is extremely safe to use while still controlling this serious pest.

To understand the gypsy moth more, this invasive species first escaped captivity in Bedford, Massachusetts in 1869 and has since moved into Ohio from Pennsylvania and Michigan. It is one of the most damaging pests of hardwood forests

and urban landscapes, defoliating millions of forested acres annually. From 2016 through 2018, it's estimated gypsy moth caterpillars defoliated more than two million acres in southern New England alone.

As a caterpillar, it feeds on the leaves of over 300 different tree and shrub species, including crab apple, Cockspur hawthorn, Common witch-hazel, pussy willow, river birch, sumac and sweetgum, many of which are also visited by honey bees. They are especially fond of several oak species.

Defoliation of trees can occur quickly because each egg mass contains between 500 - 1000 eggs. In a heavy infestation, the caterpillars will eat around the clock, with the larger sized (4th instar) caterpillar able to consume up to one-square-foot of foliage every 24 hours! Since the caterpillars are gregarious, they will stay on the same tree or group of trees until the trees have been stripped of all their leaves. Repeated annual defoliation can result in the death of the tree.

Each year, while planning the

control strategy for the season, the Gypsy Moth Program coordinators meet with multiple divisions of Ohio Department of Natural Resources (ODNR), U.S. Fish and Wildlife, USDA Forestry-Forest Health Protection, and the USDA Animal and Plant Health Inspection Service to determine the safest and most effective treatment for each area that requires control. Control is determined by the number of moths that were caught in gypsy moth traps the year before.

Three programs are used to manage gypsy moths in Ohio. These programs target the three zones defined in a spreading infestation. In the infested zone, the moth population is well established with an average of 10+ moth catches per trap over most of the area. The second zone is the transition zone with average moth catches of one to ten moths per trap. These isolated populations have developed but are not generally overlapping. The third zone is the uninfested zone, in which no pest populations have become established, but periodically a small population may appear due to human movement of infested material, such as firewood.

In the infested zone where the **Suppression Program** is used and the gypsy moth is well established, treatments are performed at the voluntary request of the landowners. While the gypsy moth population cannot be eradicated due their extensive numbers, certain areas can at least be suppressed to a non-defoliating level, to reduce the damage to the trees and the environment that are caused by the caterpillars.

The **Slow-the-Spread Program** is used in the transition zone which focuses on monitoring, detecting, and reducing isolated populations to slow the gypsy moth's natural movement across the state. Based on the number of gypsy moths caught in each of the



12,500+ traps set each year across the state, plans to manage the gypsy moth are established.

The **Eradication Program** used in the uninfested zone, focuses on monitoring and detecting any populations that may have jumped ahead of the transition zone, as a result of human movement of infested material such as firewood or other outdoor materials. Treatments are designed to “eradicate” the isolated populations before they can establish themselves. Treatments are determined based on the trap counts and specific situations.

Treatments are designed to control either the very small caterpillars (in early May) or the mating process (in mid-June) of the gypsy moth. The primary treatment options available in the program include:

Foray 48 B (*Bacillus thuringiensis var. kurstaki, Btk*) because it is one of the safest products while still being highly effective against the gypsy moth. Foray 48B is certified organic product by the Organic Materials Review Institute (OMRI) and is labeled for use in organic crop production. *Btk* is used a great deal because the bacteria is already present in the environment and when sprayed on newly opening leaves, it breaks down in the sun within seven to 10 days, thus only impacting caterpillars feeding in the area treated during that window of time. Different races of *Bt* are used for lawn and garden pest as well as mosquito control. One race of the species, *Bt aizawai*, is available in Europe (soon in the USA) to avoid damage from wax moth caterpillars in stored honeycomb. Studies have shown that *Btk* only affects caterpillars and is safe to use around honey bees, birds, fish, animals and humans.

Splat – Gypsy Moth Organic (Disparlure) is applied in mid-June, just before the adult moths emerge and start flying. It contains a

Ohio map showing the three Transition Zones for 2020.



synthetic replica of the female gypsy moth pheromone, specific *only* to gypsy moths. Applied at 1.6 oz per acre, this small amount is enough to engulf the senses of the male gypsy moths so that they become totally confused trying to find a female with which to mate. Pheromone products can only be used in low population treatment areas found in the transition zone. Splat is certified as 100 percent organic by USDA’s Organic Program and is entirely made of food grade material.

Gypcheck (Nucleopolyhedrovirus, NPV) is a naturally occurring virus made from sick gypsy moth caterpillars that only affects the gypsy moth caterpillars that eat treated leaves and is not as effective as the other products. Because it has become so expensive to produce, it is no longer being made. The limited remaining supply will be directed to areas where threatened and endangered species exist in the treatment areas.

Other treatment options include

Male Gypsy Moth image Bugwood.org



Gypsy moth caterpillar, late instar image Bugwood.org.





Gypsy moth female laying an egg case image Bugwood.org.

Mimic 2LV (tebufenozide) and **Dimilin 4L (diflubenzuron)**. Both are insect growth regulators that affect the caterpillar's molting process. They are used mainly when populations are extremely out of control. These two products only affect caterpillars and when applied in small doses in an aerial application as used for gypsy moth control it does not affect honey bees.

The goal of the Gypsy Moth Program is to protect Ohio's forests and towns from defoliation and the resulting destruction of the wildlife habitat when the trees die, while using the safest products possible for people, animals, birds, bees, other insect species and other living organisms. Ohio has 8.1 million acres of forested land. ODA will be treating 68,000 acres or .8 percent of that area in 2020. Instead of a wide spread treatment approach, ODA uses a very intense IPM effort to

isolate small developing populations and suppress them.

Research and observation have demonstrated that defoliation of trees not only affects the wildlife and citizens' quality of life, it also reduces the population of native lepidoptera which may take years to recover. Once the trees die, stream temperatures rise and aquatic life is diminished. Songbirds have less protection and are unable to provide food for their young. Honey bees living in hollow trees and other pollinator species are also affected as are the understory plants that now endure full sun. In general, the invasive and totally destructive nature of gypsy moths requires management because affected areas take decades to recover.

A spray schedule is maintained on the ODA Gypsy Moth website and updated frequently, along with other information about the products used and treatment maps.

For more information, please check the ODA Gypsy Moth website at <https://agri.ohio.gov/wps/portal/gov/oda/divisions/plant-health/gypsy-moth-program>

Questions can be directed to Mr. David Adkins, GM Manager at Phone: 614-728-6400 and email: plantpest@agri.ohio.gov **BC**

Sources:

Ohio Dept Agriculture Gypsy Moth Program <https://agri.ohio.gov/wps/portal/gov/oda/divisions/plant-health/gypsy-moth-program>

Kansas Forest Service https://www.kansasforests.org/forest_health/emerging_threats/gypsymoth.html

Univ Kentucky <https://entomology.ca.uky.edu/ef425>

<https://www.wnpr.org/post/gypsy-moths-decline-now-damage-already-done>

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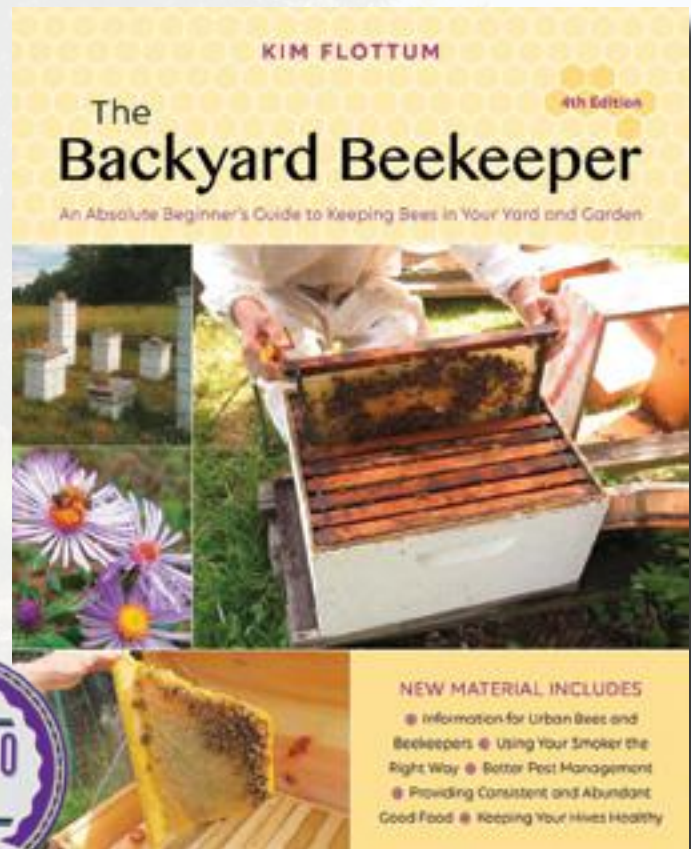
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GLEANNINGS

APRIL 2020 • ALL THE NEWS THAT FITS

MANN LAKE ACQUIRES STROMBERG'S

Mann Lake Ltd. ("Mann Lake") has acquired Stromberg's Unlimited ("Stromberg's"), a leading live poultry and poultry equipment supplier. Eric Stromberg, great-grandson of Stromberg's founder Ernst Stromberg, joined Mann Lake as Director of Poultry.

Mann Lake has long been the market leader in the beekeeping supply space and is excited to extend its reach into the large, growing backyard poultry segment. Today, Stromberg's new website launched with more competitive pricing, new products, free shipping on qualifying orders above \$100 and participation in the new Stromberg's Rewards program. More details are available at www.strombergschickens.com.

Stuart Volby, CEO of Mann Lake, commented, "We are thrilled to partner with Eric and his team to build upon Stromberg's legacy of customer service with new pricing, products and rewards. Since 1921, Eric and his family have been a reliable partner to countless poultry enthusiasts and we are honored that he chose to partner with us to accelerate Stromberg's growth."

Eric Stromberg, Director of Poultry at Mann Lake, said, "There is significant overlap between hobbyists in the beekeeping and poultry space with many enthusiasts raising both. Mann Lake's marketing reach, operational scale and national footprint will enable us to better serve our loyal customers while reaching many new customers."

About Mann Lake

Mann Lake, based in Hackensack, MN, is a market leader in the beekeeping and poultry supply markets selling wood products, plastic products, feeds, tools, medications, and apparel, among many other products, throughout the U.S. Since 1983, the Company has partnered with beekeepers to develop innovative products that protect and

support bee populations. In addition to Hackensack, MN, the Company has facilities in Woodland, CA, Marshall, TX, Wilkes-Barre, PA, Clarkson, KY and Winter Haven, FL. Mann Lake also owns and operates Shastina Millwork, a leading beekeeping wood product manufacturer, and D&I Pure Sweeteners, a leading processor and distributor of sugar. In 2018, Mann Lake completed a management buyout with the support of Grey Mountain Partners.

For more information about Mann Lake, please visit www.manlakeltd.com.

About Stromberg's

Stromberg's Unlimited has been delivering quality poultry and reliable equipment for poultry hobbyists since 1921. Previously based in Pine River, MN, Stromberg's recently moved into Mann Lake headquarters in Hackensack, MN.

For more information about Stromberg's, please visit www.strombergschickens.com.

About Grey Mountain Partners

Grey Mountain Partners is a Boulder, Colorado-based private equity firm that focuses on partnering with management to create lasting value through operational improvements and strategic growth initiatives. Since 2003 Grey Mountain has focused on the small end of the middle-market, investing in 45 companies across a wide range of industries. The firm is currently investing its \$425 million Fund III and is actively pursuing new investment opportunities. For additional details on the transaction or to discuss new investment opportunities, contact Tania Martin.

OBITUARY

We have all lost a great warrior in the battle against neonicotinoids and on a personal level I have lost a wonderful, inspiring friend. On Tuesday, March 3rd, **Graham White** of Cold Stream, Scotland lost his two year struggle with cancer and passed away peacefully in a Palliative Care Facility in Edinburgh.

As nearly as I can recall, Graham and I probably connected in late 2010 or early 2011 when I had my 20 minutes of fame as the Colorado beekeeper who got the infamous "Leaked Memo" on the EPA's faulty registration of clothianidin. We both recognized early on that we were kindred souls and the friendship grew from there.

Graham was a fierce and articulate fighter in the battle against neonicotinoids and the perversion of the EPA and the poison industry. He was an invaluable and irreplaceable resource. We fought these battles together and I gained greatly from Graham's wisdom and counsel.

In the last few years we spoke nearly every morning by way of Skype and I never failed to come

away from those morning conversations inspired and enlightened. Graham had a classical education and a rich full mind. He could speak with knowledge and authority on a wide range of subjects and in a morning I might learn about Shakespeare, rare guitars, wood stoves, opera, the ancient history of Great Britain or an endless number of other topics, along with a large dose of pesticide strategizing. I began to jokingly call Graham "Mister Encyclopedia", and indeed he was. At this time of year Graham would have been plying the local marshes to collect frog spawn for the small pond in his yard. He had wide and eclectic interests. The frogs will have to do without him now.

Graham's passing is a loss to all of us. For me it leaves a huge hole in my life. My mornings will never be the same and I will remember on every awakening how my days once began.

Rest in peace my friend. It was my honor to have known you and be counted as a friend.

Tom Theobald



CALENDAR

◆COLORADO◆

Four Corners Beekeepers Association will hold their annual Spring seminar on April 4 at Fort Lewis College in Durango.

The keynote speakers will be Jim Tew. There will be hands on workshops.

For more information visit <https://entnemdept.ifas.ufl.edu/honey-bee/extension/bee-college/>.

◆GEORGIA◆

Young Harris, Univ of GA Beekeeping Institute will be held May 13-16 at Young Harris College in Young Harris, Georgia.

Classes for all levels will be presented plus the Georgia Master Beekeepers Program and the licensing program for Welsh Honey Judges.

For information visit www.ent.uga.edu/bees. More information is available at ugabeclab@gmail.com or 706.542.2816.

◆ILLINOIS◆

University of IL Bees and Beekeeping Short Course will be held April 18 at the Bee Research Facility and the Carl R. Woese Institute for Genomic Biology.

The cost is \$100. Must bring your own protective gear. Course is limited to 50 participants.

For more information and to register email cundiff@illinois.edu or 217.265.7614.

◆INDIANA◆

Heartland Apicultural Society (HAS) will hold their 2020 conference on the campus of the University of Southern IN, July 6-8.

Watch for upcoming details and visit www.heartland-bees.org for more information.

Michiana Beekeepers Association will hold their annual meeting May 16 at 7234 W. Moore Road, Nappenee.

Speakers include Jim Tew. The cost is \$20 which includes lunch. Reservations required.

For more information and to register contact Debbie, 574.277.0152.

◆MAINE◆

EAS 2020 will be held August 3-7 in Orono at the University of Maine.

For more information visit www.easternapiculture.org/conferences/eas-2020.html. Watch these pages for details.

◆NEBRASKA◆

Beekeeping Workshops, UNL Bee Lab – Year 1 Beekeeping - Lecture February 1/Field April 25; Lecture February 15/Field April 4; Lecture February 21 & 28/Field April 17 & 24; Lecture March 14/Field May 2. Year 2 – Lecture March 21/Field May 16. Mead Making – March 28.

For more information visit <https://entomology.unl.edu/bee-lab>.

◆PENNSYLVANIA◆

Introduction to Beekeeping March 28-29 at Temple University, Ambler.

Vince Aloyo is the instructor.

For more information visit <http://vincemasterbeekeeper.com/courses/>.

◆VIRGINIA◆

The 2020 Virginia State Beekeepers Association (VSBA) Spring/Summer Meeting will be June 26-27 in Smithfield.

Speakers include Jennifer Berry and Petra Arnher. The Nansemond Beekeepers will host a Painted Hive Body Auction. For details visit www.virginiabeekeepers.org.

A workshop on Preparing, Exhibiting and Judging for the honey show will be offered June 26 8:30 a.m. to noon prior to the start of the meeting, sponsored by ApiSolutions Consortium. For more information on this workshop contact ApiSolutionsBee@gmail.com.

May 2

Principles & Practices of Biodynamic Beekeeping - Part III: Spring & Summer Hands-on guidance in beekeeping tasks through the spring and summer months, from swarm catching and growing the apiary to health checks, expansion, wax management, and more. Classes take place at Spikenard Honeybee Sanctuary in Floyd, VA.

website: www.spikenardfarm.org contact: info@spikenardfarm.org or 540-745-2153

May 14-16

Sustainable/Biodynamic Beekeeper Training The most in-depth and comprehensive beekeeping training in the USA. Classes take place at Spikenard Honeybee Sanctuary in Floyd, VA. Participants must have bees! Four sessions total, spans 2020-2021. With Gunther Hauk, Alex Tuchman and Vivian Struve-Hauk. website: www.spikenardfarm.org contact: info@spikenardfarm.org or 540-745-2153

August 22

Principles & Practices of Biodynamic Beekeeping - Part IV: Fall & Winter Learn about successful overwintering, including how to consolidate hive space, wrapping, feeding and more. Classes take place at Spikenard Honeybee Sanctuary in Floyd, VA.

website: www.spikenardfarm.org contact: info@spikenardfarm.org or 540-745-2153

October 10-11

Sun Hive Workshop: Learn how to build the Sun Hive!

This exciting hands-on hive building experience will be accompanied by lectures related to the importance of hive scent and warmth, wax, form and hive body materials. Classes take place at Spikenard Honeybee Sanctuary in Floyd, VA.

website: www.spikenardfarm.org contact: info@spikenardfarm.org or 540-745-2153

◆WYOMING◆

Wyoming Bee College will be held March 21-22 in Cheyenne, with a Pre-Conference Workshop held March 20.

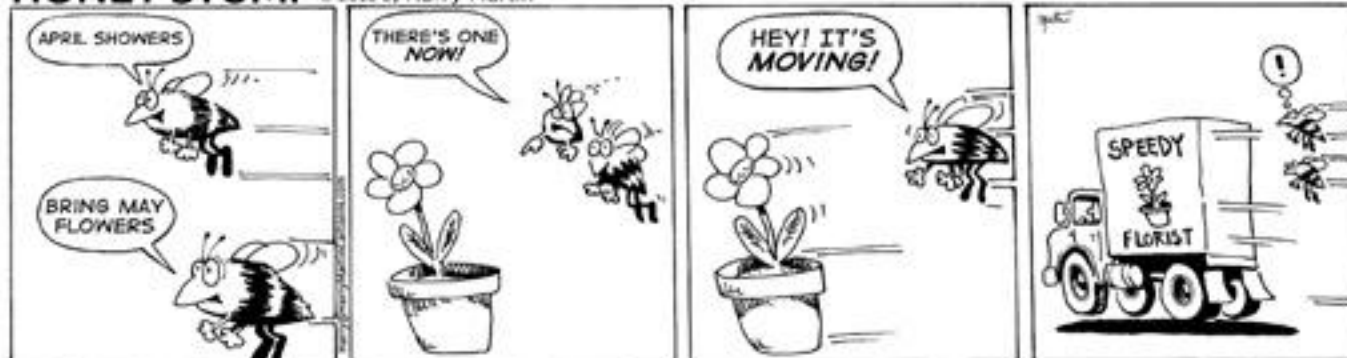
The cost of the workshop is \$125/person. The cost for the conference is \$85/person or you can do both for \$195.

Featured speakers are Phil Craft, Jamie Ellis, Scott Debnam, Reyah Carlson and more.

For information visit www.wyomingbeecollege.org.

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When my physician took X rays this week, he reported back, “Your thumbs are shot!”

“Thanks for the frank assessment,” I replied. Well, maybe “shot” was a bit of an overstatement on the good doctor’s part. What I have is arthritis at the base of both thumbs, where they connect to my wrists. It’s probably related to too many years laying block and pounding on rocks with a stonemason’s four-pound sledgehammer. Thumbs are important. Years ago when I landed on my thumb ski patrolling on Aspen Mountain, my workers’ comp doc explained, “Our thumbs are one way we’re different from the apes.”

My aching thumbs are an annoying but not yet debilitating condition. I can adapt. I look at this more as a warning sign. My Golden Years are taking a toll.

One thing we beekeepers can do to go easy on our beat-up hands is to screw or nail cleats onto brood and honey supers. These are one-inch by two-inch wood stock handles screwed or nailed horizontally onto the top of both long ends of the woodenware. So instead of squeezing the grooves on the outside of a super when you lift it, now you have a real handhold. Cleats are a standard labor-saving add-on to commercial beekeepers’ supers. Over the years, I’ve acquired a lot of woodenware from Paul, and those boxes all have cleats. I’ve also assembled a lot of woodenware myself, but I never bothered to attach cleats. Now that my thumbs ache, I get it that this is a project I need to undertake.

Pepper the Blue Heeler has a sore front left paw. When I took him to the vet, she suspected a fracture. What the X rays revealed, however, was arthritis in the joints between his metacarpal bones – his front dog toes. This is practically the same injury that I sustained! I don’t chase Frisbees, but Pepper lives to snatch them out of the air. The dear boy and I are both just going to have to slow down a little, that’s all.

The other day Marilyn let the chickens out. It was long after dark when I closed their pen door. I wondered if a predator might be inside. I can’t tell you why I thought that. I just did. When I entered the little chicken house that Marilyn built for them inside the pen, I looked up at the roosting chickens overhead. Lo and behold, there was a ring-tailed cat balancing on a ladder just a few feet from the birds! Ring-tailed cat, civet cat, polecat, whatever you want to call them. He looked hungry. He and I had a discussion. You might call it a confrontation. I believe I made my point, because I’ve seen no sign of him since. Ringtails have a musk gland. I came back to the house stinking like skunk.

Common in the arid Southwest, nocturnal ringtails look like big-eyed squirrels with raccoon tails. They have sharp teeth.

When the world was young, Pigpen and I packed in our gear on horses and floated the Gunnison Gorge. On an Indian Summer eve, we sat ‘round the campfire yarning about the big one that got away. When my partner retired to his tent, I stretched out contented under the Milky Way. Long before dawn, I awoke with a start, convinced that something was licking my bald head! When I sat bolt upright, two sets of eyes reflected the faint light of dying embers. I turned on my flashlight, and there were two ringtails staring me down! When I jumped up, they vanished. Before I went back to sleep, I stoked the fire. I kept my head inside the sleeping bag.

Later, Pigpen and I joked that experienced ringtails know that a bald head makes a good salt lick.

It’s early February as I write. This week we got a foot of snow here in Peach Valley. Yesterday the weather broke. The mercury hit 40. Late in the afternoon, Pepper and I trudged into a bee yard.



As the sun prepared to dip below the horizon, golden honey bee feces dappled the snow-covered ground. If bees can look happy, these looked happy, as they hurried home to their winter clusters.

I have a book to assemble – a collection of Bottom Board columns. Nearly every month since 2002, I’ve written one, so they add up. Now I’m culling the weak and trying to come up with 150 stories that might amuse or possibly even inform you. Don’t get me wrong. I’m no expert – just a veteran sideline beekeeper muddling along, season after enchanting season.

Do you think you’re a procrastinator? Top this: When I broached the book idea, my former *Bee Culture* editor Kim encouraged me. He said, “Just group your pieces into topics. Throw in a few pictures. We’ll publish it. You might make a few bucks.”

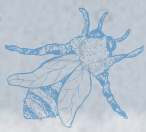
That was five years ago. In the meantime, I retired from my day job, sold some of my bees, got elected president of the Colorado Beekeepers. But I made little headway on the book. This Fall, I told myself, “Ed, get it done this Winter when you have the time. That, or forget it!”

Every writer needs a deadline. Now I’ve got one.

Ed Colby

All Thumbs

BOTTOM BOARD



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No Caps
- b DECO EMBOSSED JUGS**
5 LB - \$82.95/72 ct. Case
3 LB - \$109.95/126 ct. Case
No Caps
- c PLASTIC PANEL BEARS**
2 oz Panel Bears \$229.95/800 ct. Case No Caps
6 oz Panel Bears \$199.95/660 ct. Case No Caps
8 oz Panel Bears \$159.95/525 ct. Case No Caps
12 oz Panel Bears \$119.95/400 ct. Case No Caps
16 oz Panel Bears \$86.95/200 ct. Case No Caps
24 oz Panel Bears \$89.50/195 ct. Case No Caps

Glass

- d GLASS 3 OZ. MINI MASON**
\$19.95 /36 ct. Case
Gold Metal Lids Included
- e GLASS 12 OZ. HEX EMBOSSED CYLINDER**
\$11.55 /12 ct. Case
Gold Metal Lids Included
- f 12 OZ & 3 OZ GLASS SKEP JARS**
12 oz skep jars \$12.35/12 ct.
3 oz skep jars \$14.95/24 ct.
Gold Metal Lids Included
- g MUTH JARS**
4 oz - \$29.49/36 ct. Case
8 oz - \$13.95/12 ct. Case
16 oz - \$18.95/12 ct. Case
includes corks
- h CLASSIC GLASS JARS**
8oz - \$16.50/24 ct. Case
16 oz - \$9.45/12 ct. Case
32 oz - \$13.75/12 ct. Case



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