CHRISTMAS INTERVIEW ISSUE

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Apistan: 94.90% efficacy *(2019, Veterinary Bee Inspector, Spain)*

96% Efficacy
Apistan: 96.92% Efficacy *(2018, Veterinary Bee Inspector, Spain)*

97% Efficacy
Apistan + 50 g Apiguard: 97.97% Efficacy *(2018, Veterinary Bee Inspector, Spain)*

97% Efficacy
Apistan: 97% Efficacy *(2014, FNOSAD, France)*

93% Efficacy
Apistan: 93% Efficacy (2015, FNOSAD, France)

91% Efficacy
Apistan: 91% Efficacy (2016, FNOSAD, France)

95% Efficacy
Apistan: 95.22% (2017, FNOSAD, France)

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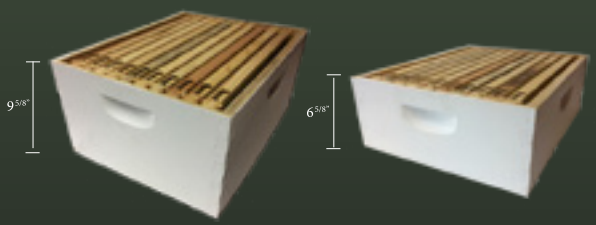

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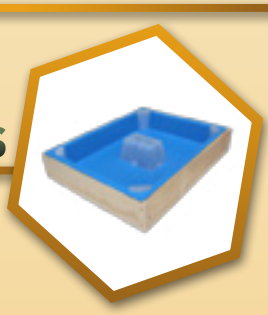

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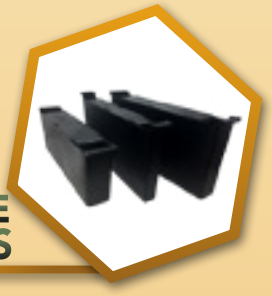

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Bee Culture

December Features . . .

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Harry Rosenberg checking the bees for Winter. (Rosenberg photo)

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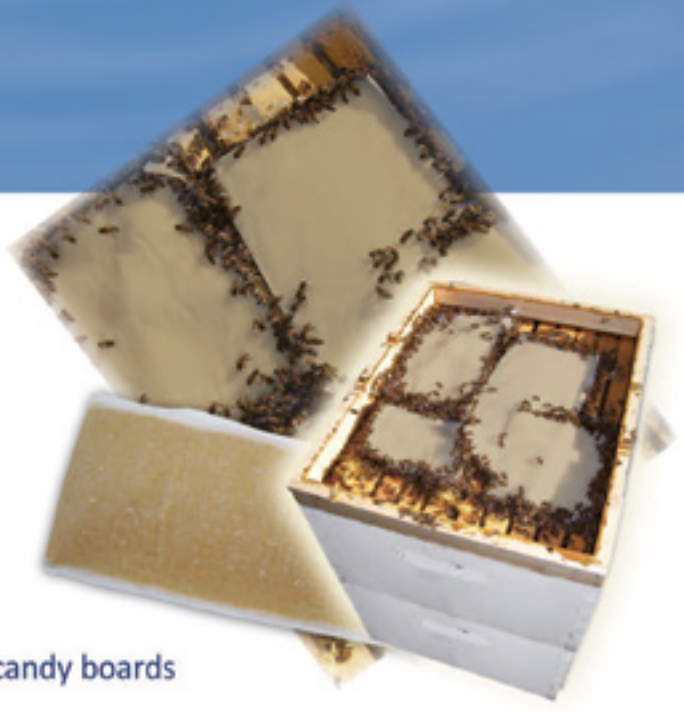

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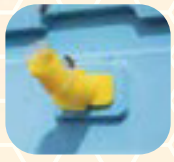
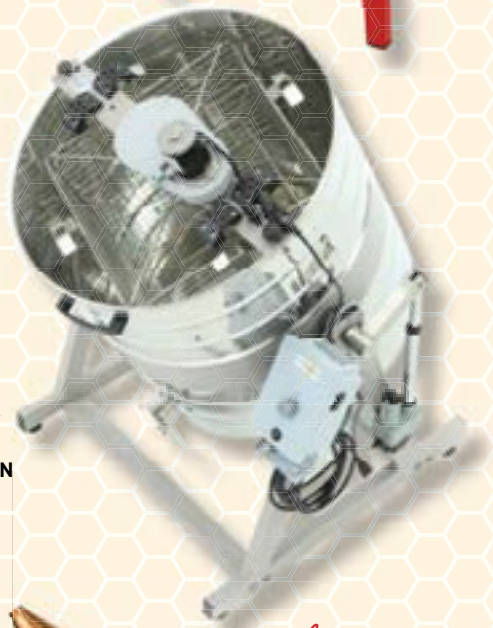


Swarm Alert for Lyson Hives

SWARMALERT



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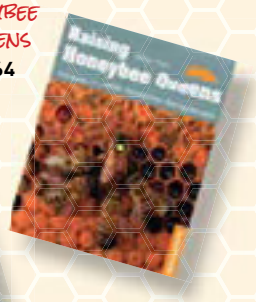

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Concerning Climate Change

To Ed Colby – I hope most of us agree that the climate does and will change. Though some of us from the old school understand why and we don't panic over it. And we wish our leaders wouldn't panic and waste zillions of dollars on things that will not help.

While I agree on cutting down in pollution as much as reasonably possible, I also wish the big farmers would farm organically or with less pollution and yet I feel the scientists must be off when they blame animals for pollution (methane gas, etc.). I believe animals were created to produce carbon dioxide which the plants need.

Now, what I'm getting to. Those of us from the old school still read the good old book. In the prophets we read the earth will wax old as doth a garment and earthquakes and storms will be numerous in the last days. But if we continue to love our fellow men as ourselves we have nothing to fear.

Sam Kanagy
Romulus, NY

New For Beekeepers –

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The best selling CIVAN 25D, a 4/8 frame radial manual with an optional electric motor and 12 frame basket will now become the CIVAN 174A – same barrel, longer legs, with the 3/12 frame basket standard. The same electric motor remains an option.

The most exciting announcement is regarding a brand new extractor – a CIVAN 3/6 (three deeps tangentially, six medium/shallow radially) only offered as an electric model. This unit is designed to fit the niche between a small manual and 12-frame electric.

The third extractor to be offered is the CIVAN Small 24 (12 deeps 24 medium/shallow) radial. This unit offers complete automation as well as a manual mode. Simply choose one of five programs, load the frames, start the machine and walk away. It runs for the preprogrammed time and then stops, allowing you to continue uncapping without watching the clock.

The Horizontal CIVAN Max G (for Maximum Gravity) has been field tested and some modifications are being made. The legs will be longer and the cross bar which holds frames in place while extracting has been slotted to shorten set up time. Because of the speed of the unit a larger valve will be added in order to evacuate the honey faster.

These four units, plus the Manual three-frame, the full frame 24 electric radial, and the Beast, a 44 frame electric radial round out the CIVAN product line.

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Lactobacillus acidophilus

induces immune response in honey bees, characterized by increased expression of antimicrobial peptide abaecin (Evans and Lopez 2004).

Bacillus subtilis

is a “fungistatic” microbe, meaning it prevents the growth of molds and other undesirable fungi, including *Ascosphaera apis,* which causes chalkbrood disease (Alippi et al. 2000, Reynaldi et al. 2004). Feeding *Bacillus subtilis* has a strong positive effect on honeybee colony health and performance (Sabate et al. 2012).

Bacillus licheniformis

secretes secondary metabolites, which inhibit the growth of pathogens such as *Paenibacillus larvae* (Alippi and Reynaldi 2006).

Enterococcus faecium

can be scarce in honey bee environment because of its high susceptibility to pesticides glyphosate and chlorpyrifos. *Enterococcus* bacteria found in bee bread produce bacteriocin-like inhibitory substances against multiple pathogens (Audisio et al. 2005).

Bacillus pumilus

can survive for long periods of time in harsh environments, then inhibit growth of multiple pathogens (Reynaldi et al. 2004).

Lactobacillus plantarum

helps detoxify pesticides such as neonicotinoid imidacloprid (Daisley et al. 2017).

By, Dr. Vera Strogolova

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The 16th Conference – and first eConference – of the COLOSS honey bee research association has now ended. Judged a great success by participants, this eConference had a record number of attendees, with 216 members from 41 countries taking part. This is a clear recognition that the COLOSS Membership (now in 102 countries) appreciate working together world-wide to make a sustained and valuable contribution to bee science.

Detailed updates were given on the COLOSS Core Projects: the BEEBOOK (standard research methods), B-RAP (Bridging Research And Practice) and colony loss monitoring; and of the COLOSS Task Forces: Apitox, nutrition, sustainable bee breeding, small hive beetle, *Varroa* survivors, *Varroa* control, *Vespa velutina* and viruses.

At the start of the year, and before the global Covid-19 crisis curtailed international travel, many constructive COLOSS workshops and meetings were held in a variety of locations. Notably, these included the well-attended first COLOSS Asia Conference, in Chiang Mai, Thailand.

Despite Covid-19 restrictions, the Executive Committee were determined to keep the spirit and activities of COLOSS alive. In the several weeks prior to the main conference, workshops for the individual core projects and task forces were held virtually. Run at times to suit the locations of those involved, attendances were generally higher than at previous physical meetings. Participants discussed experimental results, planned publications and proposed future collaborative experiments.

eConference delegates heard that a number of important COLOSS publications had been published in 2020, including two definitive reviews on bee viruses, the latest results of the international colony loss monitoring surveys and the BEEBOOK chapters on honey and bee venom. In addition, the COLOSS survey to determine the effects of the Covid-19 pandemic on bee research and extension activities had been published.

One novel feature of the conference was the addition of short video presentations of current work which replaced the normal physical poster presentations. The annual prize for the best student presentation was awarded to Birgit Gessler of the University of Hohenheim, Germany, for her poster on: "Detecting molecular markers for *Varroa* Sensitive Hygiene (VSH) trait in honey bees".

The COLOSS Executive Committee are particularly grateful to Dr Geoff Williams and his colleagues from Auburn University, USA., who hosted the eConference, and the conference sponsors: Auburn University, Alabama Extension, the Eva Crane Trust; the International Bee Research Association; Véto-pharma; Vita (Europe); and the Ricola Foundation, Nature & Culture. BC

FOR FURTHER INFORMATION PLEASE CONTACT
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Tel: +44 7918670169 Email: **norman.carreck@btinternet.com**

NOTES:

1. COLOSS (Prevention of Honey Bee COlony LOSSes) is a honey bee research association formerly funded by the European Union COST Programme (Action FA0803) and currently by the Ricola Foundation – Nature & Culture, Veto Pharma, the University of Bern and the Eva Crane Trust, which aims to explain and prevent massive honey bee colony losses. COLOSS does not directly support science, but aims to coordinate international research activities across Europe and worldwide, promoting cooperative approaches and a research programme with a strong focus on the transfer of science into beekeeping practice. COLOSS has more than 1,500 members drawn from 102 countries worldwide. Its President is Prof. Peter Neumann of the Univ of Bern, Switzerland. **http://www.coloss.org/**
2. The full proceedings of the first day of the COLOSS eConference can be viewed free of charge on the COLOSS FaceBook page: **https://www.facebook.com/COLOSS-Association-216713901804099/**
3. The paper: "Honey bee colony winter loss rates for 35 countries participating in the COLOSS survey for winter 2018–2019, and the effects of a new queen on the risk of colony winter loss" can be found here: **https://www.tandfonline.com/doi/full/10.1080/00218839.2020.1797272**
4. The paper "Diversity and global distribution of viruses of the western honey bee, *Apis mellifera* can be found here: **https://doi.org/10.3390/insects11040239** and the paper "Bee viruses: Routes of infection in Hymenoptera" can be found here: **https://doi.org/10.3389/fmicb.2020.00943**
5. The paper: "The COLOSS BEEBOOK: global standards in honey bee research" can be found here: **https://www.tandfonline.com/doi/full/10.1080/00218839.2020.1739410**
6. The results of the COLOSS study on the impact of Covid-19 on research in apidology can be found here: **www.tandfonline.com/doi/full/10.1080/00218839.2020.1799646**

In this second part of my series on the Honey Bee Health Coalition, I'd like to walk through the tools and resources that the Coalition has developed for beekeepers. The next installments will be on what the Coalition has developed for farmers, and finally we'll talk about resources the Coalition has developed for those that want to plant forage.

As I mentioned in September's From the Editor section, the Honey Bee Health Coalition's work is focused around the 4 Ps – pests and pathogens, pesticides, and poor forage and nutrition. The Hive Management group first set out to help all levels of beekeepers manage varroa in their hives as this was seen as the most pressing issue. There is a lot of bad information out there on how best to control varroa and the Coalition agreed that straightforward guidance was needed on Integrated Pest Management, and monitoring and treatment. We set out gathering and vetting resources and after about a year of work came out with the first edition of the **Tools for *Varroa* Management Guide** in September of 2015. The guide, which we consider a living document, is now on its 7th Edition and has been accessed thousands of times.

After many conversations with beekeepers we kept hearing that they really liked and relied upon the Guide, but that monitoring and treatment for *Varroa* was still really complicated and that beekeepers, especially newer beekeepers, needed more guidance. We set out to produce a series of short three to five minute videos that provide step-by-step demonstrations of utilizing an Integrated Pest Management Strategy of monitoring and treatment. The videos show bee health experts Danielle Downey, Director of Project Apis M., and Mark Dykes, past President of Apiary Inspectors of America, demonstrating the sugar shake and alcohol wash methods, and then going through all chemical and cultural control methods and demonstrating their applications. They also include insightful videos on Integrated Pest Management and a Public Service Announcement, "Will *Varroa* Kill my Bees?" All told, the Coalition produced a 12-video series that has been viewed thousands of hours since it was launched in November of 2016.

Yet we still heard that beekeepers needed more guidance on how to choose the treatments that work best for their situation and management style. To top off our suite of *Varroa* resources, we created the *Varroa* Management **Decision Tool**. The tool asks beekeepers five questions and then generates all available treatment options based on their answers. Once the options are generated, it then links to more information on the treatment and to the video demonstrating its application.

But we all know that there are many more things beekeepers need to know to keep their hives healthy beyond just controlling *Varroa*. As we've done for farmers wanting to protect bees on and around ag lands, the Coalition has developed a set of Best Management Practices for Bee Health. These BMPs, which I call, the first 80 pages of beekeeping, walk beekeepers through safety concerns and PPE, apiary and hive set up and maintenance, pesticide exposure, treatment of parasites and bee diseases, queen health, bee breeding and bee nutrition. It includes many colorful pictures and graphs that lay out the complicated art of beekeeping and what all beekeepers need to know as they begin, or are brushing up on, their skills and latest techniques.

In 2017, after the FDA mandated that all antibiotics used on bees needed a prescription issued by a veterinarian, the Coalition developed a four-page guide on identifying and mitigating foulbrood in honey bee colonies. The guide articulates what are American Foulbrood (AFB) and European Foulbrood (EFB), how to test for AFB/EFB, and what to do if there is a positive diagnosis.

This year, recognizing that using on-label treatments are really important to combat resistance and protect bees and beekeepers, the Coalition developed Registered Medications and Pesticides for Honey Bee Health. We've developed one for the **U.S.** and one for **Canada**. These one-pagers list all legal methods for controlling pests and diseases in hives.

Finally, and perhaps most important, the Coalition has been working for four years with a team of researchers from seven labs in three countries, as well as several federal agencies, to test new compounds that have shown varroacidal promise. We hope that wide-spread resistance does not occur to the compounds that are keeping our hives within manageable *Varroa* levels, but some resistance has already been seen to amitraz, and widespread mite resistance to coumaphos and fluvalinate has already occurred. The Coalition's Varroacide Resistance and Testing Team's goal is to find the next compound that kills mites without killing bees and get it in into beekeepers' hands as soon as possible.

As a founding member of the Coalition, and someone who has been in the trenches helping develop much of this work, I can say that it's high quality, vetted information that is aimed at making you a better beekeeper. It's all free and available now for you to download and print. We also have presentations designed for you to give at your local bee club. Check it all out at **HoneyBeeHealthCoalition.org**.

Jerry Hayes

From The Editor —

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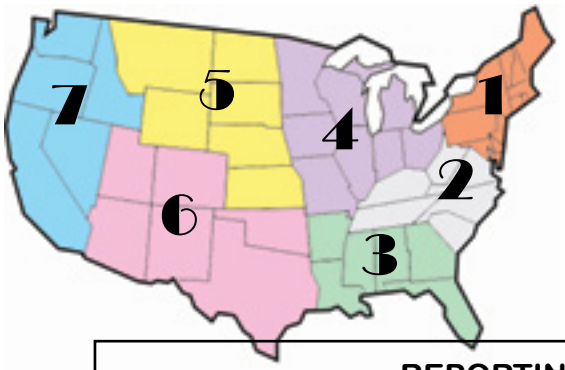

We're throwing a lot of numbers at you this month but we think you'll find them useful. Below is our monthly report from December 2019 and below that this month's report. You can see the difference for each product over the course of year, by region. You can look at yours and see what's happened over the past 12 months. One thing to consider looking at these two reports is that they are actually fairly similar. What else in your operation is the same, however? Supplies, gas, packages or nucs, labor, fees? Bulk honey is up about 10% and retail and wholesale honey are up about the same. With average price of diesel *down* 21% from a year ago, this looks okay.

REPORTING REGIONS – 2019 SUMMARY

	1	2	3	4	5	6	7	Range	Avg.	$/lb	History Last Month	History Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	1.98	2.25	2.28	2.23	1.78	2.01	2.40	1.52-2.50	2.09	2.09	2.21	2.32
55 Gal. Drum, Ambr	1.97	2.15	2.13	2.19	2.00	1.86	2.00	1.35-2.55	2.05	2.05	2.11	2.16
60# Light (retail)	236.11	186.67	190.00	167.50	155.00	181.55	218.33	120.00-325.00	200.28	3.34	195.93	208.24
60# Amber (retail)	229.55	190.75	187.50	173.60	130.00	177.15	220.83	120.00-325.00	199.32	3.32	194.88	209.05
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	106.83	74.50	110.31	75.00	78.60	84.00	110.31	57.60-194.40	94.62	7.88	89.54	85.21
1# 24/case	150.91	108.80	130.10	105.30	137.33	133.32	150.00	63.00-300.00	133.86	5.58	135.50	126.67
2# 12/case	134.02	99.40	117.45	98.32	111.84	112.80	264.00	79.20-264.00	126.27	5.26	126.65	115.27
12.oz. Plas. 24/cs	104.01	111.31	100.00	87.80	89.88	108.48	84.00	66.00-172.80	99.74	5.54	100.12	103.07
5# 6/case	147.93	115.95	145.28	122.05	113.16	126.00	145.28	71.50-240.00	134.81	4.49	140.76	129.17
Quarts 12/case	193.74	164.64	133.50	147.40	140.87	155.51	144.00	93.60-300.00	159.80	4.44	155.43	154.13
Pints 12/case	105.69	102.06	78.67	91.17	94.00	88.72	84.00	65.00-140.00	93.68	5.20	88.92	92.42
RETAIL SHELF PRICES												
1/2#	6.03	5.86	4.58	5.50	4.40	5.00	5.81	3.09-9.00	5.58	11.16	5.19	4.90
12 oz. Plastic	6.99	6.59	5.05	5.82	5.65	6.57	6.67	3.50-12.00	6.31	8.41	5.99	5.99
1# Glass/Plastic	9.02	7.86	7.53	6.95	7.82	6.50	9.25	4.50-17.00	7.99	7.99	8.06	7.56
2# Glass/Plastic	15.40	14.47	13.37	11.90	13.60	9.93	14.50	6.78-25.00	13.80	6.90	14.09	12.73
Pint	12.36	10.34	8.25	10.20	11.00	10.31	10.20	6.00-16.00	10.21	6.81	69.99	9.85
Quart	22.31	16.53	15.41	18.00	15.85	17.82	19.46	8.00-32.00	17.94	5.98	17.91	17.61
5# Glass/Plastic	30.36	27.03	40.00	27.75	27.70	27.75	40.00	15.00-50.00	29.76	5.95	28.99	27.97
1# Cream	11.09	8.75	7.00	9.86	7.83	8.50	14.00	6.00-16.00	10.18	10.18	9.90	9.17
1# Cut Comb	14.43	14.99	9.98	13.61	12.50	10.50	14.17	6.00-24.00	13.35	13.35	12.98	12.20
Ross Round	11.43	6.95	11.41	11.00	12.00	10.75	13.75	6.60-17.00	11.03	14.70	10.16	9.48
Wholesale Wax (Lt)	7.97	5.47	4.70	6.64	6.50	4.40	8.60	3.00-15.00	6.73	-	6.96	6.99
Wholesale Wax (Dk)	6.84	5.07	4.02	4.83	7.00	3.08	15.00	2.00-15.00	5.80	-	6.06	5.93
Pollination Fee/Col.	98.75	74.00	80.00	93.75	200.00	92.00	45.00	40.00-200.00	89.88	-	86.67	85.69

REPORTING REGIONS – 2020 SUMMARY

	1	2	3	4	5	6	7	Range	Avg.	$/lb	History Last Month	History Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.23	2.23	2.30	2.10	2.36	2.10	2.50	1.55-3.00	2.18	2.18	2.17	2.09
55 Gal. Drum, Ambr	2.12	2.23	2.22	1.94	2.12	1.93	2.43	1.35-3.00	2.06	2.06	2.09	2.05
60# Light (retail)	222.95	193.11	222.95	196.00	170.00	174.33	223.75	144.00-325.00	211.40	3.52	210.77	200.28
60# Amber (retail)	215.82	194.05	185.00	181.40	175.00	166.00	214.38	129.00-325.00	204.64	3.41	206.21	199.32
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	100.80	73.60	100.80	82.20	61.20	100.00	84.82	19.40-144.00	87.94	7.33	86.89	94.62
1# 24/case	181.92	127.25	142.95	115.87	149.67	126.75	154.80	45.00-300.00	145.03	6.04	131.27	133.86
2# 12/case	173.76	96.00	129.58	110.23	111.84	132.00	123.00	78.00-288.00	129.29	5.39	116.61	126.27
12.oz. Plas. 24/cs	125.65	120.86	86.40	93.24	62.22	106.80	108.80	40.68-244.00	108.96	6.05	103.70	99.74
5# 6/case	204.00	113.05	129.89	111.57	113.16	146.19	146.19	71.50-240.00	136.63	4.55	137.21	134.81
Quarts 12/case	157.76	140.29	140.47	152.38	161.49	170.33	183.00	94.50-300.00	160.80	4.47	162.63	159.80
Pints 12/case	118.26	110.02	85.50	91.47	111.00	94.00	96.00	69.84-194.00	104.61	5.81	102.43	93.68
RETAIL SHELF PRICES												
1/2#	4.50	4.93	5.25	4.68	4.24	4.45	5.77	2.89-9.50	5.35	10.71	4.89	5.58
12 oz. Plastic	7.02	6.59	5.88	5.81	4.76	6.29	6.45	2.99-12.00	6.54	8.72	6.23	6.31
1# Glass/Plastic	8.00	8.20	8.32	7.15	7.74	7.87	8.71	4.49-17.00	8.56	8.56	8.05	7.99
2# Glass/Plastic	14.75	12.60	15.37	12.55	12.72	15.00	14.75	7.99-25.00	14.36	7.18	13.92	13.80
Pint	12.97	11.49	8.75	11.86	9.90	10.10	14.28	4.00-25.00	11.44	7.63	11.28	10.21
Quart	21.26	17.38	16.77	16.20	17.02	19.20	20.17	4.90-42.00	19.06	6.35	18.23	17.94
5# Glass/Plastic	34.50	27.01	44.00	27.78	21.72	17.89	31.06	15.00-50.00	29.63	5.93	28.50	29.76
1# Cream	10.00	8.38	20.00	9.75	7.75	11.93	12.33	6.00-20.00	10.86	10.86	10.10	10.18
1# Cut Comb	14.44	10.17	11.50	13.99	10.00	12.00	15.00	6.00-24.00	13.89	13.89	13.10	13.35
Ross Round	11.58	7.05	11.58	11.50	10.00	11.00	13.75	7.00-17.00	11.15	14.87	10.57	11.03
Wholesale Wax (Lt)	8.50	8.46	4.50	6.38	6.63	6.40	9.60	3.00-16.00	7.50	-	6.32	6.73
Wholesale Wax (Dk)	7.14	6.38	2.30	4.60	7.00	2.50	10.00	2.00-15.00	5.79	-	5.31	5.80
Pollination Fee/Col.	102.59	67.50	65.00	91.67	180.00	102.59	57.50	35.00-200.00	87.68	-	89.96	89.88

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It's Summers Time –

Holiday Wishes And Hope For 2021 –

Well, here we are at the end of another year and another decade. I'm pretty sure none of us could have predicted anything even close to what this year has brought – droughts, fires, tornadoes, record number of hurricanes, elections and COVID-19. It's been a hard one. Some of us have had to learn to work at home, some of us have lost our jobs and we've lost loved ones along the way, too. Just an all around hard year.

But I hope you all have seen some positives in all of this also. Otherwise what's life all about. Families have gotten to spend more time together. I've seen healing of relationships in our own family and in others. Hard times make us sometimes take a look at what and who are really important.

It's been a year since Kim wrote his last Inner Cover and Jerry took over as editor of *Bee Culture*. It's been a much different year than any of us anticipated, but hopefully we've all seen the good. It's been a bit bumpy, as anything new can be. Change is hard! We all know that and we know it more as we get older.

But our publications team – crazy as we are – has not scared Jerry off. So here we go into his second year as Editor. Thank you Jerry for joining our team and for enduring all we have had to adjust to during this crazy 12 months.

There are several things we didn't get to do this year here at *Bee Culture*. Our last big outing was the Tri-County meeting in March in Wooster, OH. Very shortly after that Ohio and most of the rest of the country shut down. So we've missed you all at the bee meetings. We didn't get to do our Pollinator Day in July and we didn't get to do our annual October event – and it was going to be a really good one this year. So stay tuned and keep a good thought because we're going to try again this October.

And of course, outside of work there are a lot of things we didn't get to do. We didn't get to have our weekend parties during the Summer. I love those times when we have 10 or 12 friends over and laugh and talk and eat. We didn't get to have our big Easter dinner with our kids and our 'spare' kids.

We didn't get to go to church for quite awhile. The library was closed. No movie theatres. No going out to eat. These are some of my favorite things that I had to give up. I'm sure your list is a bit different.

But there are some good things that have come out of us having to get creative. ZOOM has opened up a whole new world – professonally and personally. Kim and Jerry have both given lots of talks at bee meetings right from home. It has opened up a world of opportunity for many folks who aren't always able to travel to meetings. Kim has spoken at the Colorado meeting, a Texas meeting, and several others. This also allows smaller groups that maybe can't afford to pay to fly in a popular speaker, to have that speaker at their meeting – no travel costs!

And on a personal level we do a ZOOM call with Kim's family every Sunday night. Sometimes there are as many as six or seven, sometime only three or four. Sometimes we're on for an hour, sometimes we go past the two hour mark. It's wonderful – we laugh, they tell stories about their parents who I never got to meet and stories about when they were kids. We've done a few ZOOM calls with my siblings and plan to do more.

We plan to do some ZOOMing on and around the holidays. So maybe you can still do Christmas dinner on some level with family members, even if they can't be right at the table with you. It's easy to do!

To update you on the 42nd *ABC & XYZ*. As I write this it is at the printer and hopefully when you read this it will be very close to arriving on our dock. We hope that you enjoy it. It has definitely been a labor of love – labor being a key word here. It is a monumental project. It's a relief to be done and ready to move on to other things.

I'm not sure what Christmas will look like this year at our house, but I hope that your Christmas is joyful and hopeful and that we can all come up with some new traditions that will carry over to the new year. Get creative.

Merry Christmas! Happy New Year! We're looking forward to seeing bunches of you in 2021. Keep a good thought. Take care.

BAYER Announces Blue Ribbon Winners

Lee **Redding**

As in years past, to commemorate National Honey Month, Bayer announced its 2020 Blue Ribbon Beekeeper Award winners, recognizing three next generation leaders committed to supporting pollinator health. The winners for 2020 are: Keith Griffith III of Louisville, KY (first place); Emma Stevens of Greenup, KY (second place); and Lydia Cox of Charleston, SC (third place). The first-place winner will receive $3,000 to put toward his beekeeping projects or college tuition, and the second- and third-place winners will also receive $2,000 and $1,000, respectively.

A panel of five industry experts chose the winners from a pool representing 14 states based on the applicants' demonstrated commitment to promoting honey bee and pollinator health in their schools and communities, as well as their dedication to continued learning and service within the field. The judging panel for the 2020 Blue Ribbon Beekeeper Award included:

Joan Gunter, president, **American Beekeeping Federation**

Aimee Hood, regulatory and scientific engagement lead, Crop Science, a division of Bayer

Brandon Hopkins, Ph.D., assistant research professor, apiary and laboratory manager, Washington State University

Grace Kunkel, communications coordinator, **Project *Apis m.***

Jake Reisdorf, first-ever Young Beekeeper Award winner and 2019 Blue Ribbon Beekeeper Award recipient; CEO, **Carmel Honey Company**

"It's incredibly important for the industry to recognize the hard work and dedication of our young beekeepers, and to encourage the next generation to get involved in STEM- and agriculture-related activities that help sustain our global food supply," said Reisdorf. "I was proud to read about everything these next-gen leaders are doing to support bees and amazed at how many of them are getting out in their communities to educate others about the importance of pollinators."

Each of the 2020 Blue Ribbon Beekeepers impressed the judges with their creative and impactful projects to benefit pollinators and further community education, including:

- **Keith Griffith III, 13, of Louisville, KY**

Keith has been working as a beekeeper with his uncle since he was 11. What started as a therapeutic outlet soon became more than just a hobby; it's also enabled him to start a business, **Beeing2gether**, where he sells honey, branded merchandise and a book he published in 2019, "**Honey Bees and Beekeeping: A Mental Health Miracle**." Since writing his book, Keith has been featured on local Louisville television shows to raise awareness about the importance of honey bees and how beekeeping can provide an outlet for those suffering from mental illness. In the future, Keith hopes to expand his business and build a rooftop apiary where he can provide hands-on educational experiences for students and community members looking to learn more about beekeeping.

- **Emma Stevens, 16, of Greenup, KY**

Emma is deeply committed to educating her community about the importance of pollinators. Through her high school agriculture department, she volunteers with local elementary school junior bee clubs to teach younger students about beekeeping. Emma serves as her high school's Future Farmers of America (FFA) vice president, where she provides educational information to local farmers and other community members on the impacts of honey bees. In the future, Emma hopes to start a bee club at her high school, conduct a three-day junior bee camp for students in second through sixth grades, and organize a STEM Day for her district's four elementary schools, with local high school students leading hands-on science, technology, engineering and math activities.

- **Lydia Cox, 17, of Charleston, SC**

A fourth-generation beekeeper, Lydia has been keeping bees since she was seven years old and works with her family to sell honey as a way to raise money for college. Outside of the family business, Lydia volunteers with local community groups to help preserve environmental resources and teach younger children about pollinators and local ecosystems. She has since become an intern with the Charleston Parks Conservancy, where she's piloted a citizen science program through the iNaturalist platform (helping to expand these projects to more than 25 city parks). Lydia is currently designing an urban pollinator garden near one of the conservancy's community gardens at the conservancy, and will include

Left to right – Keith Griffith, Emma Stevens and Lydia Cox.

pathways, seating, educational signage and pollinator-attractant plants for hummingbirds, butterflies and honey bees.

Applicants were required to submit answers to two essay questions and provide a professional reference from a mentor involved in their project, such as a beekeeper, community or agricultural organization leader, grower, teacher, school official or member of another relevant organization. As a testament to the quality of this year's entries, the judges also selected three applicants as honorable mentions for their exceptional commitment to pollinator health: Andie Funk, 16, of Jacksonville, NC; Jessie Cline, 18, of Cleveland, NC; and Rebekah Hope Watts, 15, of Rankin, IL.

Also in recognition of National Honey Month, Bayer and Project *Apis m.* released an updated version of their Healthy Hives 2020 (HH2020) e-booklet, "*Research for Tangible Bee Health Solutions.*" The booklet, which provides an overview of the program and progress to date on projects funded since HH2020's inception in 2015, also features two newly funded research projects:

- **Helping Bees Come in from the Cold:** Development of a Practical Guide to Indoor Storage for Bees – Brandon Hopkins, Ph.D., Washington State University
- **Size Matters – Bigger Mites Mean Bigger Problems for Bees:** Exploring Possible Mechanisms of Chemical Tolerance of *Varroa* Mites in U.S. Honey Bee Colonies – Dennis vanEngelsdorp, Ph.D., University of Maryland, College Park; Steven C. Cook, Ph.D., USDA-ARS, Bee Research Laboratory, Beltsville, Maryland; Krisztina Christmon, Ph.D., University of Maryland, College Park

"Since our partnership began with Project *Apis m.*in 2015, the Healthy Hives 2020 initiative has continued to focus on delivering measurable, impactful solutions for beekeepers," said Daniel Schmehl, pollinator specialist with the Crop Science division of Bayer. "Over the past five years, Bayer has given $1.3 million towards this initiative, and I look forward to seeing how these research projects directly benefit the beekeeping community and honey bee health well beyond 2020."

Healthy Hives 2020 and the Blue Ribbon Beekeeper Award are initiatives of the Bayer Bee Care Program, which continues the company's 30-year history of supporting pollinator health. For more information on Bayer bee and pollinator health initiatives, please visit: **beehealth.bayer.us**. You can also follow and share with us on Twitter and Instagram @ Bayer4CropsUS. BC

Bayer is committed to bringing new technology and solutions for agriculture and non-agricultural uses. For questions concerning the availability and use of products, contact a local Bayer representative, or visit Crop Science, a division of Bayer, online at ***www.cropscience.bayer.us.***

FOUND IN TRANSLATION

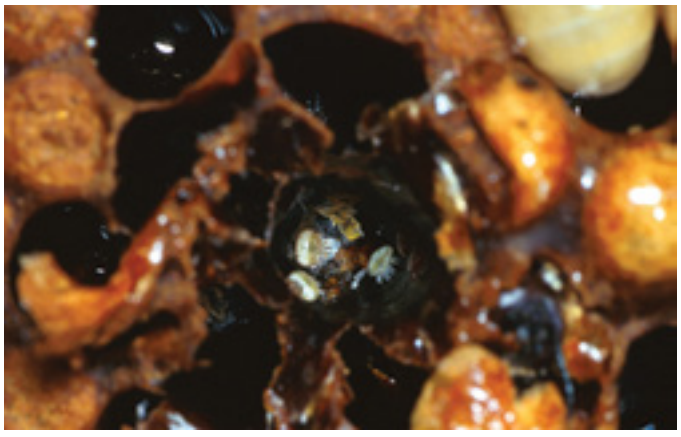
Supressing Mite Reproduction One Yard At A Time

Jay **Evans**, USDA Beltsville Bee Lab

2020, forgettable in many ways, has been a good year for studies describing how to select for honey bees that resist *Varroa* mites. Jacques van Alphen and Bart Fernhout from the Netherlands offer an expansive open-access review of selectable bee traits that inhibit *Varroa* (Natural selection, selective breeding, and the evolution of resistance of honey bees (*Apis mellifera*) against *Varroa*, *Zoological Letters, 2020, 6:6,* **https://doi.org/10.1186/s40851-020-00158-4**). They describe routes of resistance and tolerance to mites at both the individual bee and colony level. 'Resistant' bees do something to inhibit mite numbers while 'tolerant' bees or colonies can survive mite loads that less tolerant bees can't, most likely because they handle viruses and other mite-specific stresses better or compensate for mite damage in other ways. The ways used by bees to manage their mite populations are staggering, scaling up from inhibition at the individual brood or worker level to hygienic behaviors and changes in queen traits such as periodic brood breaks or colony traits such as swarming.

All of these potential routes have been scrutinized by scientists and beekeepers. Selection for mite resistance, human-enabled or not, has given rise to clear population-level successes in reducing mite levels. Bees derived from the African subspecies *A. m. capensis* and *A. m. scutellata* are well known to reduce the impacts of *Varroa* through behaviors. In parallel, certain lineages of European subspecies have been fortified against mites through intense beekeeper-driven selection or, on the other hand, purposeful neglect. After covering specific behavioral and physiological traits that deter mites, van Alphen and Fernhout end with several fascinating vignettes of highly mite-resistant populations. Certain themes recur in these resistant populations, giving one hope that our bees really have a core of defenses against this threat.

Still, the authors give a sobering assessment of honey bee populations in Europe and North America, stating that "most unprotected colonies of European honey bees in these continents succumb when infested with *Varroa* and resistance to *Varroa* has not increased in the 40 years after the *Varroa* invasion." Why has it been so hard to move populations toward a less damaging relationship with mites?



Mite family. (Photo by Scott Bauer, USDA-ARS)

One common theme of these two continents is consistent use of chemical controls for *Varroa*. Quitting those controls outright is not likely, and indeed efforts to select for a healthy bee population with longterm resistance to mites will no doubt need some combination of mite management and relentless selection for genetic resistance. As one additional insight from this review, while hygienic behaviors such as grooming and colony-level traits were important, one trait was common to bee populations that have survived longterm without chemical treatment against mites: a tendency to slow mite reproduction in capped cells.

Fanny Mondet (a French researcher) and colleagues across much of Europe carried out a very careful analysis of this very trait as described in "Evaluation of Suppressed Mite Reproduction (SMR) Reveals Potential for Varroa Resistance in European Honey Bees (*Apis mellifera* L.)" (*Insects,* 2020, 11, 595; **doi:10.3390/insects11090595**).

The 23 authors involved in this effort focused on the SMR trait in a very broad sense. Many actions from both bees and mites can lead to SMR, from poorly mated mites to miscommunication between developing bees and female mites, to the abilities of worker bees to exert *Varroa*-sensitive hygiene (VSH) and disturb mites by uncapping and recapping brood cells. In this study, if female mites of a certain age were found without male offspring and/or daughters on the path to successful development they were labeled as SMR victims. Female mites with at least one healthy daughter of the

right age, the common state, were scored as such. The authors settled on a narrow range of developing bees (seven to nine days post-capping) and set up a strict ranking system to assess the reproductive success of mites linked to those bees. To 'count' as a success, mite offspring had to be of an appropriate age to mate and exit with an emerging bee as reproductive females.

After establishing these criteria, the team screened for SMR in 17 populations spread across 13 European countries. They opened thousands of brood cells, scoring over 10 single-foundress events in 414 colonies and 35 or more such events in 176 colonies. As expected, SMR levels based on 35 single-foundress cells provided a more robust estimate of a colony's SMR tendencies, and they recommend 35 as a minimum for those hoping to check their colonies for this trait. They found, in these populations, higher SMR levels in subspecies *ligustica, mellifera,* and *caucasica* when compared to other subspecies or selected hybrids (e.g., Buckfast). They also found differences in SMR across the sampled countries. But the central message, as in other attempts to find mite resistance, is that each population had some potential for this trait. As expected, stock that had been selected for survival in the face of mites, along with stock bred for VSH traits, showed higher SMR levels than did unselected stock.

By keeping their sampling consistent, the authors could infer which flavor of SMR was most important in populations. Delayed mite reproduction was the most likely source of SMR, followed by infertile females and, last, no offspring males. Delayed mite reproduction, or an abundance of foundress mites with few daughters, could indicate either direct inhibition of reproduction or VSH activity targeting cells whose mites are actively reproducing.

Along with describing a protocol that can be applied by anyone and anywhere, this study highlights the selective potential in most bee populations for resistance to mites in the form of decreased mite reproduction. They also show that SMR reflects additive traits, some host-related and some related to the behaviors of nurse bees. The ability to select for all of these resistance traits in one assay is a great advance for breeders. This team provides precise protocols for testing and selecting for SMR at the website **www.beebreeding.net** along with a bit of optimism that this selective regime, if carried out laboriously at a decent scale, can truly make a difference against the *Varroa* threat.

Varroa *on pupa.* (Photo by Scott Bauer, USDA-ARS)

Most beekeepers will not have the patience to breed improved bee stock, but all beekeepers can be selective in acquiring stock from breeders who are attempting to do so. Breeders have more and more tools to favor genetic resistance against mites, from the reproductive inhibition tests described here to hygienic screens of various types, and the many mite-screening tools available to see which colonies tend to support smaller mite populations or slower mite growth.

Incorporating these filters seems well worth the added cost when generating production queens. As a "good-genes" fan, I hope the precise genetic variants behind resistance traits will soon be available as useful breeding tools or markers. In the meantime, determining mite reproduction in a few dozen singly-infested brood cells of just the right age is not an impossible task. If you choose to undertake this, you will learn something about how your bees stack up against the norms described by Mondet and colleagues.

Along with a notebook and fine tweezers, the tools needed to check for this trait are minimal. Depending on your eyesight, you will likely need some strong reading glasses or even a hand lens or cheap dissecting microscope to accurately count mites as you pull brood out of cells. If you enjoy doing this, and have some sway over your beekeeping neighbors, over time you might start an evolution revolution in your own backyard that will be good for bee health. BC

BEEKEEPING IN COVID ENGLAND

Clare **Densley**

One minute we were listening to the news about this weird virus in China and the next, it seemed, we were all told that we had to work from home, or be furloughed until further notice. Martin Hann, my bee department colleague, and I had just begun the first of our beginners' lessons and were looking forward to a Spring and Summer of courses, workshops, taster days, hosting visits and outreach mentoring.

On March 17th we waved our new group goodbye, and drove over to the Home Apiary to check a couple of colonies needing attention. We chatted idly about different characters in the class and made presumptuous predictions about who was going to be good and which ones were already looking confused. When we got back to the Bee Barn, which is next to the Gardening department, we noticed that all of the gardeners' cars had gone and there was no one around but us. Maia, a gardener, was just getting into her car and we flagged her down and asked where everyone was? She told us that everyone had been sent home until further notice. I phoned our line manager who was already at home. I said that the bees would need to be looked after (we have around 30 colonies) and that Martin and I would continue to come in to do that. He said that was fine as long as we stayed two metres apart.

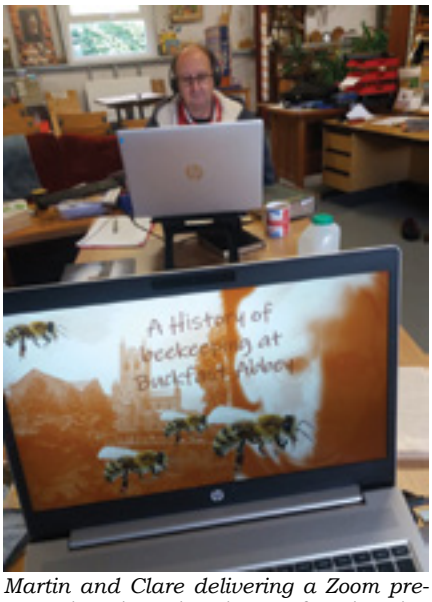
England went into official lockdown on the 23rd of March. All of our courses were cancelled until further notice. Some days we worked from home on our laptops but as the season progressed there was more than enough to do on site working with the bees.

All of the local BBKA branches abandoned their practical and social meetings. Initially our lockdown was quite strict. We were all supposed to stay at home and only venture out for an hour a day to exercise. The roads were empty and the police could stop you driving your car to ask where you were going. Beekeepers were allowed to visit out apiaries though, because bees are classed as livestock and so I used to travel to work wearing my bee suit just in case I had to prove my intentions.

We spent the Summer playing with the girls and feeling lucky to be outside for more than our allotted time. We reared queens and tinkered around with different apiary genetics to improve the temper of some of the colonies which had become not so joyful to handle. We experimented with different techniques of queen introduction and learned from some spectacular mistakes. We almost forgot the world was being ravaged by a lethal virus. The bees were a fantastic distraction and a relief.

As the lockdown restrictions relaxed we allowed individuals to come to the barn to discuss their beekeeping dilemmas and we did go out to help people who were stuck. We spent an awful lot of time replying to bee problem emails and phone calls. I think that this has been the way with the BBKA too.

As I write, restrictions in England, Wales and Scotland have relaxed but are now beginning to tighten up as a second wave of Covid is emerging. Facemasks are compulsory in shops and public transport to allow the economy to function, but there are stricter localised restrictions where the virus levels are rising.



Martin and Clare delivering a Zoom presentation about the History of Beekeeping at the Abbey.

Martin and I are dispensing Zoom talks to BBKA's countrywide from a variety of subjects from the "History of beekeeping at Buckfast Abbey" to "Sex and the Wanton Virgin Queen". We do this as a double act to lighten the tone and provide a conversational delivery.

Webinars are how most BBKA's, beekeeping conventions and bee lecture events are being organised at the moment. Even the National Honey Show was on line this year. It's a shame that we can't all meet up. I'm looking forward to face to face teaching again. I suspect group sizes will be smaller and that social distancing will have to be observed. We have been filming a lot this year to supplement our teaching next year. Just some short clips to illustrate simple skills. One of my beginners from last year told me that they could never see what we were trying to show them when they were all clustered round a hive watching us anyway, so maybe it has forced us to improve our teaching techniques!

The bees have had no crisis though and are thriving. The parkland and grass verges in many towns and cities were allowed to grow thick with flowers (beautiful weeds) and people have been planting their gardens whilst restricted at home.

Our bees have always been flexible if circumstances around them change and we could take this approach as a sensible alternative to mourning the loss of what we cannot do at the moment.

I am always astounded by the resourcefulness and creativity of the superorganism. I try not to anthropomorphise, but sometimes the simple problem solving strategies of honey bees are just lovely and make me smile. We, the human race, just need to work together. BC

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Minding Your Bees And Cues, Part 3

Digging For Clues

Becky **Masterman &** Bridget **Mendel**

In the September issue of *Bee Culture*, we highlighted a number of questions we receive from beekeepers and the public. Today we want to focus on one of the most mystifying questions of all, which is ***Where did my bees go?***

They could have been stolen. Remember the great bee heist of 2017? Or perhaps you recently relocated them (see our article in the November issue on moving bees for more on this topic)?

However, it is much more likely that they died from mite-vectored viruses.

In late Fall or Winter, it is too common for a beekeeper to crack open their hive and find it virtually empty of bees. They reach out to us with a common list of seemingly incongruent clues: The bees had plenty of pollen and honey, and produced honey to spare. The brood looked beautiful all Summer. The cluster looked robust going into Fall. Several weeks later, the bees were gone, but honey stores remained.

The answer to the riddle is often that they died of mite-vectored viruses. While a beekeeper can tell a lot about their colony from sight and smell, there are certain things that even the most acutely observant beekeeper can't discern just by looking. One of these things is mite infestations. Just because they are physically large enough to see, doesn't mean they aren't wily enough to avoid detection. Some beekeepers phrase it this way: "If you see mites on the backs of bees, your colony is already dead." This is because at the crucial phases when mite populations need to be managed, they are hiding out and multiplying in the brood, or tucked cozily in between the abdominal plates of worker bees.

Frustratingly, the viruses that those mites are vectoring while feeding on your bees are also unreliably symptomatic. Similar to the adage that seeing mites is seeing a walking-dead colony, seeing signs of deformed wing virus or parasitic mite syndrome means your colony is already severely damaged, if not dead (Lee 2018). Oftentimes, these potentially lethal viruses are present, but completely asymptomatic, leaving you with the impression that your bees are the picture of good health.

So while it's important to learn to read the bees for visual, olfactory, and even auditory cues, we need to dig deeper to determine how healthy the bees are below the surface. Unless you are a virologist keeping bees on the rooftop of your diagnostics lab, your best bet is relentlessly monitoring for mites (alcohol washes or powdered sugar roll tests are the only reliable way to estimate current mite infestation levels, though they aren't foolproof; remember to account for that large fraction of the mite population cavorting under capped brood cells).

We don't know enough about how the viruses spread, how different strains interact, or which ones kill colonies, so the best we can do is manage the mites that are vectoring the viruses. How and when you manage mites is the topic for another day, or rather a topic for endless debates over coffee, beer, long seminars, longer blog posts, boring articles, intra-lab disputes, or regional bee club meeting keynotes.

The important thing is to manage, and to manage actively. Study the life cycle of mites. Corner a local beekeeping expert for mite management options, or use the Honey Bee Health Coalition's decision tool that helps identify treatments based on temperatures and beekeeping philosophies (see below).

We manage our bees for mites because we don't want to wake up one Fall or early Winter day to an empty hive. We do it for our neighbor's bees, so their colonies don't become hosts to sick workers from our collapsing hives. And we're learning that we also have to look out for the native bees living near our apiaries, as honey bee viruses can spill over to native bees, with potentially harmful consequences. It's another part of beekeeping that is mostly invisible (though Bee Squad team member Anne has brilliantly visualized it for you below). We don't know enough yet about pathogen spillover, but, as exhausting as it is to point to mites yet again, managing them will at least help control the virus issues, mitigating the risk for your bees, and for all bees. BC

There are two opportunities for virus to be vectored to bees during the Varroa *life cycle. This drawing demonstrates where transfer of viruses occurs. Graphic design by Anne Turnham. Funded by 2017 NCR-SARE Grant: Training an Influential Network of Farming, Beekeeping and Extension Experts to Promote Bee Health.*

Graphic design by Anne Turnham. Funded by 2017 NCR-SARE Grant: Training an Influential Network of Farming, Beekeeping and Extension Experts to Promote Bee Health.

Honey bees visit flowers and leave pathogens (like viruses) while collecting nectar and pollen (1). When other bees visit the same flowers (2), they can leave with pathogens that they pick up during their foraging trip (3). Graphic design by Anne Turnham for the University of Minnesota Bee Lab.

Use the Honey Bee Health Coalition's *Varroa* Management Decision Tool for help with management: **https://honeybeehealthcoalition.org/varroatool/** and please report your data to **www.mitecheck.com**.

Check out this site for an abundance of education regarding death by *Varroa*: **https://pollinators.msu.edu/keep-bees-alive/**.

References

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Acknowledgement

The authors would like to thank Dr. Marla Spivak for helpful edits and suggestions.

Becky Masterman led the UMN Bee Squad from 2013-2019 and currently alternates between acting as an advisor and worker bee for the program. Bridget Mendel joined the Bee Squad in 2013 and has led the program since 2020. (Photo of Becky and Bridget from 2014, before social distancing).

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BEE VET

Diagnostic Approach

Dr. Tracy **Farone**

This semester I have been inspired to voluntarily sit in with undergraduate sophomores (19 & 20-year-olds!) and take genetics. Retake genetics. As a trained biologist and veterinarian, of course, I have studied genetics in the past. Genetics permeates just about every aspect of medicine and biology, which I have utilized throughout my career. However, the last time I sat in a genetics classroom was nearly 25 years ago – and it would be quite an understatement to simply say that much has changed in this field since the last millennium. Bees have been part of my inspiration to update my brain on the subject since genetics can play such an important role in honey bee health. With the volumes of information out there on honey bee genetics, I am attempting to equip myself to pick through the weeds of opinions and science on the subject.

It is important that we never stop learning. In the next few articles of *Bee Vet*, I would like to walk you through how a doctor, a veterinarian, works through a diagnostic process. My hope is to give you insider insight on how vets are trained to think in this scientific approach and how this process can benefit beekeepers and honey bees. This first article will focus on history, prevention, initial exams, and record keeping. Part two will focus on diagnostics and we will wrap up the series with treatment plans, medications, and return full circle to prevention.

History – Good doctors, nurses, and veterinarians are trained to get a good medical "history" about any patient before doing an exam or even seeing a patient. We will ask questions. This could seem like the third degree and some of the questions may even, at times, seem "dumb." But in our detective work, we will use open-ended questions as a technique to try to objectively learn about you, your operation, and your animals. This knowledge can help us best determine and fully understand what challenges a beekeeper and their bees may be facing. This also helps us establish the Veterinary Client Patient Relationship (VCPR) which is required by federal and state veterinary laws for us to legally practice medicine on an animal or a group of animals *(see article insert).* These laws state that "the veterinarian has sufficient knowledge of the patient" and "is personally acquainted with the keeping and care of the patient".

So, what can a beekeeper expect to be asked? The following questions are examples of typical information collected in a honey bee operation medical "history". These questions can and should be asked before a veterinarian starts any examinations of colonies.

1. What type of beekeeper (backyard, sideliner, commercial) and beekeeping operation (single yard, multiple yards, how many colonies) are you?
2. What is the reason for the consult? What is the desire/goals of the beekeeper for the visit? Are there any concerns, previous or current suspect pathogens?
3. What is the duration and severity of any concerns?
4. What are the current biosecurity practices practiced by the beekeeper? Are there any biosecurity plans in place?
5. What medications, feed, or chemicals are already in use at the beeyard/hive, including duration and dosage of any treatments applied?
6. How do you manage nutrition with your bees?
7. How do you manage *Varroa* with your bees?
8. Are any relevant hive records available?
9. Have you brought in any new stock lately?
10. Can telemedicine be used to facilitate our visit or follow-up?

Prevention

The old adage, "An ounce of prevention is worth a pound of cure." is a medical truth that is widely demonstrated in honey bee health. With all animal species, veterinarians spend much of our time applying preventative medicine. From nutrition to vaccines to parasite control to management practices, we employ preventative strategies as a rule in house cats to cattle herds. With our bees, we certainly prefer to prevent or limit diseases before they occur. Knowing what preventative practices are already employed in an operation can help us determine which diagnoses are more or less likely. I know beekeepers like their privacy. I do, too. But understand that information exchanged between a beekeeper and a veterinarian in a legitimate VCPR is confident and privileged information and it is a veterinarian's role to give beekeepers the best advice to meet your bees' and your operation's needs. We will encourage practices that not only prevent or treat one disease but improve the overall health of your colonies in the short and long terms.

The Federal definition and minimal States' definition of a VCPR:

1. A veterinarian has assumed the responsibility for making medical judgments regarding the health of (an) animal(s) and the need for medical treatment, and the client (the owner of the animal or animals or other caretaker) has agreed to follow the instructions of the veterinarian.

2. There is sufficient knowledge of the animal(s) by the veterinarian to initiate at least a general or preliminary diagnosis of the medical condition of the animal(s); and

3. The practicing veterinarian is readily available for follow up in case of adverse reactions or failure of the regimen of therapy. Such a relationship can exist only when the veterinarian has recently seen and is personally acquainted with the keeping and care of the animal(s) by virtue of examination of the animal(s), and/or by medically appropriate and timely visits to the premises where the animal(s) are kept.

Exams

After a good history is taken, it is time to examine your colonies. Full or partial inspections will be necessary depending on the situation. It is nearly impossible to evaluate a situation without an examination of the problem in the context of its environment. This is where you can be of great help to the veterinarian. Ideally these exams should take place in-person in your yard with you and your veterinarian working together as a team. First time visits and new conditions require on-site visits per VCPR laws. With the emergence of COVID-19, telemedicine has made some visits and follow-ups possible utilizing this technology.

Here are some points to remember:

1. While a veterinarian will likely have their own tools, it is best biosecurity practice to utilize your beekeeping tools (smoker, hive tools, even veils) in your yard. This helps to limit disease spread to or from your yard. Be sure to have tools ready to make the best use of time.
2. Veterinarians are great resources for making practical biosecurity recommendations that could improve the health of your colony/ies. Pick their brains on preventative medicine practices you could employ. Try to have areas where handwashing and boot cleaning can be performed.
3. Veterinarians may use disposable gloves. I know there is a wide array of opinions amongst beekeepers in using gloves, but veterinarians are well trained in how to use disposable gloves in ways that can limit disease transmission and may choose to employ disposable gloves in certain situations.
4. If a veterinarian is visiting your apiary for a sick hive or yard, they should examine that hive or yard last to prevent disease spread as much as possible.
5. Exams should be efficient but thorough. Quick, jerky or rough handling of frames should be avoided. Veterinarians will look to follow your method of working your bees, if you utilize a smooth, confident approach.
6. During an exam expect that veterinarians will want to run tests and take laboratory samples to confirm any tentative diagnosis made in the field. Confirmational objective data is always good.
7. Expect that veterinarians will keep records of the exam and any testing done. This is required by law. You may request copies of these records from your veterinarian.
8. Expect follow up calls and/or exams from the veterinarian. This is part of the process and the law.
9. If AFB is suspected, the state apiarist should be called immediately.

Record keeping

Collecting medical histories and conducting examinations are about collecting as much relevant information as possible and using this information as tools to best improve our bees' health. One of the best preventative medicine tools, helpful in both history and exams, is maintaining good hive records. Maintaining a system of individual hive identification numbers or names is critical in developing accurate records, as well.

In my travels around the beekeeping world, I have noticed that this is an area we as beekeepers can improve on. As part of my Christmas gift to you and just in time for the new year, I am sharing a simple, calendar year, hive record system with you that I developed for myself and my students. It may be helpful to backyard beekeepers, beginners or just anyone who would like to get started keeping records. The monthly records have suggestions or reminders of what you **could** be doing during that month of beekeeping depending on your management style. It focuses on regular monitoring of several key factors that determine bee health, including nutrition, hive inspections, *Varroa*, honey and seasonal management. Its seasonality is based on western Pennsylvania weather, so it could vary somewhat for you depending on the climate you live in. All you need is a three-ringed binder or an I-pad and you are on your way.

Next month, we will dive into the details of various diagnostics utilized in the beeyard and how they can help us care for our bees! BC


WEEKLY ASSIGNMENTS

NAME: _____ MONTH: _____ YEAR: 20

POSSIBLE TASKS	WEEK 1	WEEK 2	WEEK 3	WEEK 4/5
NUTRITION: Remove feeders				
VARROA: Mite check if not done in April Formic acid Remove drone brood				
EXAM: Full exam Brood check				
HONEY: Honey supers on				
SEASONAL: Swarm box out Wax collection/melt				
NOTES				

Sample calendar page. Visit ***www.BeeCulture.com*** *to get a pdf of actual size for printing out or scanning to your IPad.*

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A Closer LOOK

HONEY BEE EGGS & OOGENESIS

Clarence **Collison**

What Do We Know About Eggs?

"The honey bee egg is a smooth, white, sausage-shaped object about 1.5 mm in length. Drone eggs are longer and wider than worker eggs (Bishop 1961)." Eggs are produced within the tubules called ovarioles that make up the ovaries. "The development of the honey bee egg begins in the narrowest part of the upper end of each ovariole. The egg matures and grows as it passes down the ovariole. Each ovariole can be seen to contain alternating smaller and larger structures, like a string of round and oval beads. The large oval beads are eggs which are nearly mature, the round beads (trophocytes) provide food for the eggs, and are ultimately entirely absorbed by the eggs and disappear (Stell 2012)."

"In the honey bee, the ovaries exhibit marked caste differences in the number of ovarioles, which vary between 180 and 200 in queens and two to 12 in workers (Snodgrass 1956). These caste differences arise during larval development as a result of differential feeding of queen and worker larvae and consequent caste-specific modulation of the juvenile hormone and ecdysteroid titers (Rachinsky et al. 1990).

"The elevated juvenile hormone titer in queen larvae prevents the induction of programmed cell death in the ovariole anlagen at the onset of metamorphosis (Schmidt Capella and Hartfelder 1998) and, consequently permits the survival and differentiation of practically all of these into functional ovarioles."

"This contrasts with worker larvae where most ovarioles degenerate in response to a disorganization in the actin cytoskeleton in the germ cells. The dissociation of actin from spectrin in the larval germ cells occurs as a result of the low juvenile hormone titers in worker larvae and could be rescued experimentally by hormone application (Schmidt Capella and Hartfelder 2002)."

"At the very beginning of the ovarioles the individual cells within the tube are not separated from each other, and form a protoplasmic mass containing cellular organelles. A little further on the protoplasmic mass has budded-off cells which form a single line of discrete cells with cell membranes. These are primary oogonia. Soon individual cells from amongst these become larger, surrounded by smaller cells and contained within an epithelial layer of even smaller cells. These larger cells are the oocytes, which become the eggs. The smaller cells provide food for the developing eggs and are known as trophocytes. The epithelial cells progress to enclose the oocytes and the trophocytes in round structures known as follicles (Stell 2012)."

"A pattern of alternating clumps of trophyctes and follicles progresses along the ovariole. The growth of the oocyte relies on nutrients absorbed by the trophocyte through the walls of the ovariole. In the latter half of the passage of the oocyte down the ovariole these nutrients are given up again by the trophocytes to enable the oocyte to enlarge to become an ovum. Effectively these nutrients are assimulated within the ovum as the yolk. This will provide nourishment for the first three days until the egg hatches, and be the substrate for the development that occurs within the egg. In the final stages of the passage along the ovariole a shell (chorion) is applied around the ovum and it becomes an egg (Stell 2012)."

"Virgin honey bee queens were allatectomised (surgical removal of the corpus allatum) a few days after emergence. Surviving queens were treated twice with CO_2 and introduced into small colonies. All the experimental queens started oviposition. Then they were injected with a C^{14} or H^3- amino acid mixture. Blood samples were analysed by densitometric and radiometric methods to determine the vitellogenin titer and vitellogenin synthesis.

Incorporation of yolk proteins into the developing oöcytes was studied by autoradiography. Normal drone brood production was observed in allatectomised young queens, although both vitellogenin titer and vitellogenin synthesis were lowered by about 10%. Autoradiographs showed a normal pattern of vitellogenin incorporation. The results demonstrate that in the honey bee, initiation of oögenesis and maintenance of vitellogenesis can take place in the absence of corpora allata, which are the normal source of juvenile hormone supply (Engels and Ramamurty 1976)."

"Forty honey bee eggs from two unrelated, similar-sized colonies were measured weekly from 1 June to 12 August 1990, in Ithaca, NY. The eggs were obtained from a section of comb, containing both worker- and drone-

sized cells on which the queen was confined for 24 hours. Egg length and width fluctuated significantly in both colonies throughout the experimental period. There was no statistical difference between sexes, and eggs destined to produce drones during the swarming season were not necessarily larger (Henderson 1992)."

"The chorion (outer covering of the egg) of the micropylar area (small opening in egg where spermatozoa enter) of eggs dissected from oviducts of mated queens had a prominent network of ca. 116 canals of varied shape and size, whereas most eggs laid by virgin or mated queens had indistinct, shallow depressions. The micropylar pattern of a few eggs treated with fixative immediately after being laid by mated queens was intermediate between that of oviducal eggs and older eggs laid by queens. The micropylar chorion of eggs laid by laying worker bees had an intermediate pattern similar to that of some newly laid queen's eggs. The change in chorionic morphology was fertilization-independent, for it was observed on all fertilized eggs and unfertilized eggs laid by mated queens (Williams 1986)."

"Amiri et al. (2020) conducted a series of experiments to study the effects of genotypes, colony size and colony nutrition on variation in egg size produced by honey bee queens. Queens from different genetic stocks produced significantly different egg sizes under similar environmental conditions, indicating standing generic variation for egg size that allows for adaptive evolutionary change. Further investigations revealed that eggs produced by queens in large colonies were consistently smaller than eggs produced in small colonies, and queens dynamically adjusted egg size in relation to colony size. Similarly, queens increased egg size in response to food deprivation. These results could not be solely explained by different numbers of eggs produced in the different circumstances but instead seem to reflect an active adjustment of resource allocation by the queen in response to colony conditions. As a result, larger eggs experienced higher subsequent survival than smaller eggs, suggesting that honey bee queens might increase egg size under unfavorable conditions to enhance brood survival and to minimize costly brood care of eggs that fail to successfully develop, and thus conserve energy at the colony level."

"Respiration rates in queen-laid and worker-laid eggs were determined for the three days of embryonic development. Respiration was quantified by measuring the amount of CO_2 produced during 13 hours of artificial incubation at four temperature treatments: 28°C (82.4°F), 31°C (87.8°F), 34°C (93.2°F), 36°C (96.8°F) (± 0.5°C). The mean respiration rates for fertilized and unfertilized eggs from queens were 140.3 ± 4.0 and 141.2 ± 12.2 nl CO_2/h/egg, respectively. The mean respiration rate for unfertilized eggs from laying workers was 125.1 ± 6.3 nl CO_2/h/egg. Mortality results, as indicated by pre-emergence embryos, showed that 75% developed at 34°C (93.2°F) compared to 37.5% at 36°C (96.8°F). Low temperatures of 28°C (82.4°F) and 31°C (87.8°F) had 12.5% and 50% embryos developing to pre-emergence stage, respectively. Respiration results showed significant differences between the different days of incubation and temperature treatments, respectively. No significant difference was observed between the fertilized eggs and unfertilized eggs from queens at the same temperature treatment. The comparison of unfertilized eggs from queens and those from laying workers also showed no significant difference. When CO_2 output on all the days and temperature treatments were compared, a significant regression (R^2 = 0.645) was obtained (Mackasmiel and Fell 2000)."

"Eggs 0-12, 0-18 and 0-24 hours old were removed from the combs and kept at 31°C (87.8°F), 33°C (91.4°F), 35°C (95°F), or 37°C (98.6°F) until they hatched. Under all conditions 80-100% of the eggs hatched within 60-162 hours; the percentage did not depend on temperature or the age at which the eggs were received. The pre-hatching period was quite variable, and decreased as the incubation temperature increased. Under similar conditions, the younger eggs hatched sooner than the older ones. Of eggs exposed to low temperature (3-5°C (37.4-41.0°F) for 10, 20, 30, 60, 120, 180 minutes), 60-100% hatched, within 72-144 hours. When incubated at 35°C (95°F) the cooled eggs required about the same time to hatch as other eggs. It was concluded that honey bee eggs can withstand reasonable variation in temperature (31-37°C; 87.8-98.6°F); the limits of toleration were not determined (Adlakha and Laidlaw 1970)."

"Collins (2004) needed detailed information on the age at which honey bee eggs hatch and the natural variation of this trait. Therefore, honey bee queens were caged on a clean, empty comb for four hours to obtain groups of eggs of known age. These eggs were collected from the comb using a special forceps and placed on beeswax-coated petri dishes. Individual eggs were observed from 65 hours after oviposition until they hatched (48.6% hatched). A tracheal network became visible approximately two hours before hatching. Then slow flexing of upright embryos and abdominal peristalsis were seen. Release of a fluid along the dorsal midline of the embryo was observed rarely in normal hatching. In contrast, fluid was frequently observed seeping from bulges on embryos that hatched poorly (30.6%). In a normal sequence, the eggshell was gradually digested away, and complete hatch accomplished. The age at which this occurred was significantly different between eggs from different queens, ranging from 66 to 93 hours. Hatching age maybe a useful marker for selection of faster development time overall, a possible mode of resistance to the varroa mite. Respiration was visible in the larvae for one to nine hours after hatch."

"The development times of female eggs were significantly shorter ($P < 0.01$) than development times of male eggs. Throughout their development period, the eggs were kept in an incubator (34.8°C (94.6°F, 60-80 % relative humidity) without adult bees. Haploid and diploid male eggs required about three hours longer than female (always diploid) eggs. It is not known whether the

development times of haploid and diploid male eggs are significantly different. Female eggs from 20 unrelated queens had mean development times that ranged from 68.8 to 74.2 hours at 34.8°C (94.6°F); the 20 means averaged 71.4 ± 1.2 hours (SD). The development times were altered by very slight changes in temperature. Female eggs kept at 34.8°C (94.6°F) hatched about 1.4 hours sooner than those kept at 34.3° C (93.7°F). Only 1% of the eggs hatched when kept at 29.8°C (85.6°F) (Harbo and Bolten 1981)."

"In a side-by-side test in Venezuela, 593 eggs from seven Africanized queen honey bees and 355 eggs from seven European queens (from USA) were kept in an incubator (35 ± 1°C, 95°F) without adult bees. Eggs from the two groups hatched after 69.6 ± 1.06 hours and 73.3 ± 1.14 hours, respectively, indicating a basic physiological difference between developmental periods for eggs from the two populations (Harbo et al. 1981)."

"Studies were made to determine the incidence of hatching of honey bee eggs incubated in various positions. Petri dishes with basal layers of wax, paraffin, or drone foundation were used as supporting surfaces for eggs. The lowest successful hatching incidence was 58% for eggs kept in the inverted position; the highest incidence was 67% in an ordinary prone position. The average hatching incidence of 62% shows that hatching is not influenced strongly by the position of the egg. Eggs placed into petri dishes but without regard to their position showed an average of 78% hatchability. The resulting larvae, reared artificially on larval food, showed normal growth and development. Excessive shaking or bumping does not appear to affect satisfactory hatching (Dietz 1964)."

"The effects of different levels of relative humidity (R.H.) on the hatching of honey bee eggs was studied (Doull 1976). The optimum range for normal hatching was found to be between 90 and 95% R.H. There was a significant decline in the number of normal larvae that emerged when eggs were incubated at 100% and 80% R.H. At 50% R.H. many eggs shriveled and of the remainder, only 2.9% produced normal larvae. No eggs hatched at humidities below 50% R.H. Abnormal hatching was found to be due to failure of the hatching fluid to dissolve that part of the chorion covering the heads of the larvae."

"Wegener et al. (2010) investigated whether differences in the reproductive biology of honey bee queens and laying workers are reflected in their eggs. They first tested the capacity of queen- and worker-laid male eggs to withstand dry conditions, by incubating samples at 30.0, 74.9 and 98.7% relative humidity. They found that worker-laid eggs were more sensitive to desiccation. Secondly, they measured the weight and quantities of vitellin, total protein, lipid, glycogen, and free carbohydrate in queen- and worker-laid eggs. Although worker-laid eggs were found to be heavier than queen-laid eggs in two of the four replicates, no systematic differences were found regarding nutrient content. Finally, they compared the duration of embryo development in the two egg types. Worker-laid eggs developed more slowly than queen-laid eggs in two out of three replicates, suggesting that they may only be partly mature at the moment they are laid."

"Mechanical stresses by a narrow glass capillary were applied to unfertilized eggs of honey bees to determine whether the removal of meiotic blocks of the eggs could be caused by simple mechanical stimuli. The treated eggs developed into the anaphase of the first meiotic division at 15 minutes after treatment, whereas the untreated eggs remained arrested at the metaphase of the first meiotic division. The results of histological examination of the common oviduct showed that its inner widths were sufficiently narrow to cause the distortion of eggs passing through it. The distorted eggs could be fertilized and develop into diploid embryos if they were exposed to the semen immediately (within 30 seconds) after egg distortion. However, this would not happen if the distorted eggs were exposed to semen later (30 minutes). The eggs exposed to the semen but not given mechanical stimuli could initiate the embryonic development with diploid chromosomes. The interval between mechanical distortion and sperm acceptance by eggs in vitro (outside the living body and in an artificial environment) is compatible with that of natural oviposition of fertilized eggs by honey bee queens. These results suggest that egg activation by mechanical stresses in the common oviduct is valid for the natural oviposition in honey bees (Sasaki and Obara 2002)." BC

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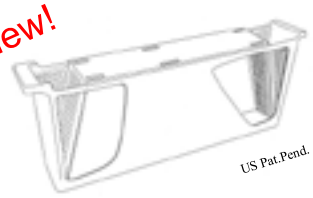

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Interview With Mel Machado

John **Miller**

How many times have you been stung?

I was actually able to outrun every bee that I encountered from about the age of eight until about three years ago and then I got stung three times in one year. I have to admit that I got what was coming to me on each of those occasions.

What is your connection to Blue Diamond? How did that start?

I am the Director of Member Relations for Blue Diamond Growers and I have been in this role for five years after serving as a field representative in northern Stanislaus and San Joaquin counties for about 23 years.

Do almond growers care about beekeepers and honey bee health?

I am going to say yes, growers absolutely do care about honeybee health and the beekeepers that provide pollination services. Naturally in the world of conventional varieties, cross pollination requires honeybees and without it you are not going to be able to get a crop. Even for those with self-fertile Independence and Shasta, there are good indications that crop yields are improved by employing hives in the orchard to enhance pollination. Honeybees are a major expense in almond production. So, it is in the best interest of growers to care about bee health and to work with their beekeepers to ensure that they have the best pollination possible each year.

Is honey bee colony health in anyway linked to almond pollination events?

I do believe that bee health and colony strength are directly linked to the quality of the pollination during the almond bloom. Naturally it makes sense that if the hives are stronger and have a greater population of bees, we should get greater activity in the orchards and potentially better production.

What is your relationship with Project Apis m?

We have a working relationship with Project Apis m. and have developed a partnership supporting the Seeds for Bees Program. We've also had Billy Synk as a presenter at several of our grower meetings as we work to increase grower knowledge of Best Practices for pollination. Our relationship with PAM is expanding and growing as we focus more directly on pollinator sustainability with our members. Bees are a key component of Almond Sustainability and PAM is a great partner to help our growers become sustainable leaders.

What could 'we' do better to partner with beekeepers and growers?

The easiest thing to do is to have an open line of communication between the grower and the beekeeper. I believe that the relationship is more than that of a service provider and a customer. The use of a living organism in the orchards to provide pollination is really more of a partnership where both parties benefit. We encourage our growers to have long term relationships with the beekeepers that they source their bees from. The relationship between grower and beekeepers should be mutually beneficial. Healthy bees and strong colonies will provide almond growers with the best opportunities for optimal pollination and almond orchards that are safe for the bees will help to build stronger colonies for the beekeeper. Everyone wins.

What is your suggestion(s) for a better healthier relationship?

Beekeepers should work throughout the year to ensure that their colonies are in the best possible condition. Best practices for *Varroa* mite control/management and proper nutrition for the colony are obviously critical for optimal colony condition at the start of the almond bloom. At the same time growers should work to ensure that their orchards are in the best possible condition to support the work of the honey bee before, during and after the bloom. This includes the proper use of pesticide materials, providing forage for the bees prior to the bloom and ensuring that clean water is available for the bees while they're in the orchards.

Mel Machado is Director of Member Relations for Blue Diamond Growers, having served in that role since December of 2014.

Mel began his career at Blue Diamond in August 1992, in the role of Field Supervisor serving member/growers in northern and western Stanislaus, as well as all of San Joaquin County. He added the role of Special Projects Coordinator in 2011, taking on additional duties supporting the data management needs of the balance of the Field Staff, and providing management support for the Member Relations Division.

Mel holds an Associate of Science degree in Agronomy from Merced College, a Bachelor's of Science Degree in Plant Science, concentrating in Vegetable Production & Plant Protection from California State University-Fresno and a Masters of Arts in Vocational Education from the Consortium of the California State University.

Mel's personal interests focus on flying and photography. He and his wife, Pam live on 19 acres in Oakdale, California, which were planted to almonds in 2019. BC

OH's Dept. Of Ag, Dorothy Pelanda

Susan **Showalter**

Background

Agriculture has always been part of my life. I currently live on the farm where I was raised in Union County, Ohio where I have many fond memories of my involvement in 4-H and growing up in an agricultural family.

Being in the Current Agricultural Use Value program on our farm, our responsibilities included soil and water conservation, wildlife management and invasive species management in order to qualify. Because of this, I have a personal understanding of life on the farm and a true passion for agricultural land stewardship.

Later in life, as I earned a law degree, I served my community first as a local attorney, then as a legislator. As a legislator I had the privilege of serving the people of my district and served two terms on the Agriculture Committee.

Role as ODA Director

Today, I am proud to serve the people of Ohio as the 39th Director of the Ohio Department of Agriculture. I have a historic connection to the Ohio Department of Agriculture of which I am incredibly proud. My great-great-great Uncle Gideon Liggett served eight years on the Ohio Board of Agriculture, which was the precursor to the Department in the early 1900s.

In addition to providing leadership for the agricultural industry, the Director of Agriculture administers numerous regulatory, food safety, and consumer protection programs for the benefit of all Ohioans. As Director, I am dedicated to upholding Ohio's agricultural laws and rules, and that includes our apiary industry.

Honey bees as an Important Aspect to Agriculture

Food and agriculture is the No. 1 industry in Ohio, adding more than $124 billion to the economy each year and employing one in eight Ohioans in jobs that are both on and off the farm. Ohio's diverse agriculture industry includes more than 200 diverse crops and livestock that not only provide us with food to eat and milk to drink, but also products that we use every day such as clothing, lumber, and fuel. We owe that success not only to the hard-working farmer, but also to the honey bee.

ODA Oversees the State's Apiary Industry

Honey bees play a vital role in Ohio agriculture as pollinators of one third of what we eat every day, including many of the fruit and vegetable crops grown in Ohio, such as apples, peaches, cucumbers, and pumpkins. They also pollinate seed crops, soybeans, hay, and wild plants. Soybeans are incredibly important to our industry and are a top crop grown in Ohio.

Because of this, the Ohio Department of Agriculture puts great emphasis on supporting Ohio's beekeepers and its apiary industry. The Department has a full-time state apiarist on staff coordinating these efforts. The State Apiarist oversees

county apiary inspections to assure a healthy beekeeping industry across the state. Beekeepers are required to register each apiary annually with the Ohio Department of Agriculture so that colonies may be counted and examined for diseases and parasites. In 2019 beekeepers registered 10,650 apiaries and an estimated 51,942 bee colonies.

Ohio has a county inspection program in which counties appoint a county apiary inspector from April 1 through the end of October to inspect apiaries and provide management recommendations for the beekeeper. The state apiarist uses information gathered during the season to help the inspectors and the beekeepers maintain the health of the beekeeping industry in Ohio.

This year has been particularly challenging with the onset of COVID-19. From scarce supplies like gloves and sanitizers, to finding ways to safely hold educational classes and routine inspections, we worked through many issues.

Fortunately, as the season progressed, county apiary inspectors resumed their work and noted good honey crops and mostly healthy colonies. With extremely high temperatures experienced this summer across Ohio, beekeepers did not treat colonies with Formic or Oxalic Acid products for *Varroa* mites. This led to higher mite levels, resulting in potential honey bee health problems this Fall/Winter. As we have plunged into cooler temperatures in the fall, county inspectors have continued to help beekeepers count their *Varroa* mite populations and advised on control techniques.

This year, despite the challenges, I am proud of our shared progress. In 2020, Ohio was able to register 6,220 beekeepers, 9,455 apiaries and register 46,282 colonies. Ohio also successfully implemented a new queen certificate and inspection process with the goal of reducing the timeframe for receiving a queen certificate. This new process provides a more rapid certification process which allows the beekeepers to sell queens and nucleus colonies earlier in the beekeeping season.

Ohio's agricultural success would not be possible without the honey bee and Ohio's apiary industry continues to be a strong and important component of Ohio's food and agriculture industry. ODA is proud to stand alongside Ohio's beekeepers and our local partners to provide the best support and oversight possible to keep this industry growing. BC

Jennifer Berry – Thespian To Apiculturist

Dewey **Caron**

Do y'all know Jennifer Berry, Research Professional and Lab Manger for the UGA Honey Bee Program? She has been a frequent contributor (80+times and counting) to *Bee Culture* or maybe she's spoken at your bee program. Since her start in the bee arena 20 years ago, she has travelled to meetings in over 25 states, and eight countries. Since 2014, she has interviewed a broad mix of interesting individuals for the December Interview feature (and be sure to read her contribution for this year). This year it is my privilege and honor to turn the tables and interview Jennifer.

Part I: Lets start at the beginning. Jen grew up "all over" as the only child of an Air Force father. For stability, she spent her Summer months frolicking about at her grandparent's farm, located outside of Holden, Missouri. Some of her fondest memories were from those times on the farm. Her first bee encounter happened there as well. One day, her grandfather and she visited an old oak tree down from the horse barn. Her grandfather jumped out of the truck, grabbed a sharp knife out of the toolbox and without protection, reached into a large hole in the tree, removing some honey-filled comb just for her. Jen remembers it was the most delicious thing she had ever tasted, once they brushed the bees away. They would return to "harvest" that tree for years to come.

Jen attended high School in Florida and was involved in the thespian club. Following graduation, she moved to San Antonio, TX to be closer to her dad, who by then had retired from active military service. Since Jen was a little girl her dad wanted her to attend Texas A&M, where he, years prior, had obtained his Master's degree in computer science. Jen started at A&M as a Biomedical Engineering major but that didn't last long. If you know Jen, I bet that was something you didn't know?

That fateful day: After class one day, Jen vividly remembers walking by and then entering the theater building. Creeping down the hallway, she heard the familiar sound of theatrical voices. She timidly decided to peer in the window and see a group acting out a scene from Shakespeare's *Macbeth*. She was captivated and eventually worked up the nerve to enroll in the next acting class. One week into the class she knew engineering was not for her, she wanted to be an actress. Only problem, how was she going to explain switching majors to her dad; engineering to theatre. With Jen as his only child, and "being the most patient man on the planet," as Jen remembers him, he graciously (after a couple of big gulps) accepted and supported her decision.

The theatre program at A&M was not large but was an intimate one built around two dynamic professors and acting coaches, Dr. Sodders and Dr. Maryann Mitchell. For several years the theatre majors travelled to see productions as well as putting on numerous plays on and off campus. These were good and taught Jen a whole lot about acting.

If you have ever had the pleasure to hear Jennifer give a bee talk you know in addition to solid bee content, she will include a personal (often very funny) story in her talk, one that grabs your attention, largely for her telling. During my interview, she had me laughing as she related her birdseed-filled bra story – stop me if you have already heard it!

Birdseed bra? It seems one of the A&M stage productions, *Getting Out* by Marsha Norman, called for a very busty female part that Jennifer was to fill. The director insisted that she appear as very well endowed. The props people tried several materials to enhance Jennifer's bust line, but to no avail, the director remained unsatisfied. She wanted it to look more, "natural and bouncy." That's when it was suggested to fill a very large cupped bra with birdseed. So this special birdseed-filled bra was custom-made for Jennifer. It was perfect – well sorta – until . . .

Opening night. As she entered the stage, Jen heard this ping, ping, ping. At first Jen was confused by the sound but then realized it was birdseed hitting the floor. Her bra, on the left side, had sprung a leak! By the time the scene was over, one side had completely deflated. And to make matters worse, the rest of the play had to be performed while walking/sliding on birdseed scattered across the entire stage. By the next day, virtually everyone on campus, everyone in College Station, maybe everyone

Jen after a show.

Jen in LA with fellow comedians.

in Texas, had heard about the deflating birdseed bra. She got many comments about her performance, "One minute Dolly Parton, the next" – "Alfred Hitchcock's *Birds* would have appreciated this performance" – Comments one an aspiring actress was not really hoping for. Here birdie, birdie, here birdie, birdie!

After that fateful performance, she visited a comedy club in Chicago; she was immediately mesmerized by the improv group entertaining the crowd. Feeling more suited to comedy than pursuing a serious acting career, she left A&M and set out to be a comedian. She had to tell her dad first, who once again, "head in hands, accepted and supported my decision." There were a few side trips in order to fund her comedic path, one was picking apples in Washington state and living in a cabin, miles from anyone, with no electricity, running water or indoor plumbing but plenty of apples to eat. The perfect way to save money!

After the orchards of Washington, and a few plays in Austin, Texas, Jen landed in Columbus Ohio to work with an improv troupe called *The Outpatients... Committed to Comedy*. Jen worked with three fellows who were extremely talented. The troupe travelled to college campuses and did gigs in comedy clubs around the U.S. Initially pay might be nothing more than a free drink, or a basket of French fries, but eventually there was money to be made. Together, they decided to go to Hollywood where they could be "discovered." At the last minute the three backed out. So, alone, Jennifer set out to follow her dream.

Off to Hollywood – next the big break: To support her meager comedian income, she did a number of day jobs, bartender and waitress, (yes the classic – every L.A. bartender/waitress is a star waiting to be discovered). She washed cars, walked dogs, wrapped presents and made fancy baskets at a Christmas store. She dealt blackjack, was an assistant to the superintendant in her apartment building, anything by day so she could improve her comedy by night in pursuit of the dream!

What would be her best booking ever came at The Improv on Melrose Avenue in West Hollywood. She was booked to go on at the coveted 9PM Thursday night slot. For months, she rehearsed her set with friends, in smaller comedy clubs, in front of the mirror, in the shower, because she needed her 20 minute routine to be perfect. Then, that night, around 8:30PM, there was a last minute change, a substitution. Jerry Seinfeld happened to stop by and asked if he could jump on stage for a few minutes. No one was about to tell Jerry Seinfeld "no" since he was the hottest comedian with the number one rated TV show at the time. Bud Freeman, owner, came into the greenroom to tell Jen that she would go on after Jerry. As he walked out, the rest of the comedians in the room said, almost in unison, you are screwed! No one can follow Jerry Seinfeld. Well, as it went down, Jerry stayed on stage for over an hour and Jennifer's booking was re-scheduled for the 7PM slot the next Monday, not an ideal booking night or time. Her 20 minutes at The Improv were not the dream she was following.

Then a few weeks later as luck would have it, Jen was having a late night dinner with a friend. The waitress, well into her fifty's, said she too was in L.A. to become a comedian and she was waiting – at any moment, her break would happen. Jen said that's when it hit her "Would this be me in 20+ years" still waiting for "the break"? Although happy doing comedy and hanging out with great fellow comedians in LA, Jennifer began to seriously question her professional ambitions. Then, there were a few more persuasive things like an earthquake, fires and floods, the usual stuff for Southern Californians, that helped to convince her, maybe it was time to leave LA.

Jen discovers bees

Start Part II: After leaving LA, Jen moved to her grandparent's farm since she had always considered the farm her home. She enrolled in Central Missouri State College, in Warrensburg, MO. To gain credits in science, she took an entomology course – and loved it. She confessed to always be an "outddorsy" type of youngster growing up and always loving bugs. One day, in a discussion with her botany professor, she was encouraged

Jen with her 'Outpatients' Improv Troupe.

to investigate the University of Georgia for entomology. The professor knew first-hand what a great instructional program UGA had since she was a PhD graduate of UGA.

Transferring to UGA a year later, Jen took a bees and beekeeping course offered by Dr. Keith Delaplane. In her own words "the clouds parted, the angels sang, the trumpets sounded" by the second class. She knew then a whole different chapter in her life was about to happen. In 1998, she finished her undergraduate degree and then became Keith's first Graduate student. After graduation, Jen took the job as Research Coordinator and Lab Manager of the University of Georgia's Honey Bee Lab.

Extension: Over the years, Jen has found a comfortable niche as an extension professional. She stands out in the world of apiculture not only for the depth and breadth of her outreach efforts but additionally for her grace and passion of her commitment. Initially, Jen performed extension activity within Georgia, working to advise beekeepers and 4-Hers; such efforts continue to the present. She soon found herself accepting invitations to teach in other states and countries.

In 2015, Jen teamed with then Georgia Beekeepers Association President, Bear Kelly, (whom she interviewed for *Bee Culture* in 2016) to create the Georgia Prison Beekeeping Program. The program aims to teach beekeeping to Georgia inmates along with helping them prepare for the University of Georgia's Honey Bee Program, Georgia Master Beekeeper exam. Bear acknowledges that Jen was really the person who got this program off the ground. To date over 130 individuals have become certified beekeepers through the program with five completing the Journeyman level and two becoming Master Beekeepers. The program promises more to come.

Young Harris Beekeeping Institute: Each year, the UGA Bee Lab puts on the Young Harris Beekeeping Institute, which brings together dozens of local, national and international experts. Ann Harman, a long-time contributor to *Bee Culture* who passed away this past May, was an invitee to the 2002 Young Harris Institute event. She subsequently invited Jen to give short course talks for the 2003 Eastern Apicultural Society program at Bowdoin College in Maine. Well everyone loved her, loved her stories and her remarks. This was the start of Jen's speaking career, which she has always been thankful to Ann for making it happen.

Since then, she's hardly missed an EAS, been invited to HAS and WAS, and to date, has given over 500 lectures to local, state, national and international audiences. In 2006, she hosted the EAS at Young Harris, as President, the first one held in Georgia. I had the pleasure to nominate her and then congratulate her for the EAS 2019 Roger A. Morse teaching, extension and regulatory award. Jen was only the second female to be so recognized.

Overseas work: Jennifer has gone beyond Georgia with her extension and research work. In our interview, she was enthusiastic about a recent trip to Guatemala. She teamed up with entomologist Dr. Gwen Keller, USDA APHIS, and Jorge Ibarra, Director of the Apicultural Technology Transfer Center who are both instrumental in the MOSCAMED program. MOSCAMED's mission is "the maintenance of a sterile medfly barrier north of Chiapas, Mexico, and to gradually extend the barrier further into Guatemala, designed to keep the pest from infesting the United States."

Jen's MS graduation.

The team visited coffee and beekeeper cooperatives to solicit their support of MOSCAMED. Earlier efforts in the fly control program used the insecticide Malathion that had a negative impact on honey bees and the surrounding environment. The current insecticide used to control the flies is non-toxic to bees or the environment. The program is seeking to restore the trust of beekeepers and coffee growers, so they can become cooperators in controlling medflies. Jen's role was to offer research assistance, along with organizing future beekeeping and queen rearing classes.

Jen has had other overseas visitations. She was in Bolivia on a Farmer-to-Farmer assignment in 2002. I go every year to Bolivia, and I can tell you the beekeepers still ask me how Jen is doing. Jen has been instrumental in helping UGA Bee Lab graduate students complete their field studies. One such student was Nabor Hector Mendizabal. Nabor, notably the most knowledgeable beekeeper in Bolivia, is quick to acknowledge that without Jen, he would never have completed his degree. In other trips, Jen has also worked with the Exuma Foundation to teach beekeeping and queen rearing on Exuma Island, Bahamas. Additionally, she has taught women and young teens beekeeping and queen rearing in several regions throughout Nicaragua, one of her toughest three-week assignments.

Down on the farm: In 2006, Jen started her own queen and nuc business, Honey Pond Farm. She journeyed to Brushy Mountain in Moravian Falls, NC, where Steve and Sandy Forrest sold her enough equipment for 100 hives. The bees came from Bob Binnie, Blue Ridge Honey company. The initial 15 colonies quickly became 50 colonies, then became 100, and 100 became 200 and so on. Y'all know that drill. Nights and weekends, Jen and her husband Mark Davis, devote their time to caring for their bees after full days of work with UGA bees. As she puts it, it's all about the bees; as you might expect, knowing Jen, they stress quality not quantity when it comes to their queens and nucs.

After 20 years at the bee lab, Jen has started a whole new effort; a PhD program. It was a commitment to her

Jen at Brushy Mountain.

Dooly State.

dad before he passed away last year. The program involves having three publishable papers, so, Jen is weaving a study on Oxalic acid (collaborating with Dr. Geoff Williams at Auburn University), a bee habitat restoration project with Department chair, Dr. S. Kris Braman, her supervising professor, and a third project with Crop and Soil Scientist, Dr. Nick Basinger. Needing to find time to work on the PhD, Jen has decided to downsize their own apiary and teaching at the farm. However, she is continuing to make the farm property more bee and pollinator friendly.

One more story: During my conversation with Jen she confessed to being fooled twice by an old gag. Before she was "into bees", while still a struggling actress, she along with her theatre group, had the honor of hosting the famous comedian and actor Leslie Nielsen. After his final performance of the week, Leslie was invited to a party in which he would be fed homemade tamales and scotch, (weird? But Jen said that is what he wanted). As she and her friends were sitting around the kitchen asking Mr. Nielsen a myriad of questions, an unusual sound erupted from beneath him. Nobody said a word since it was obvious to all what the "noise" was; Leslie seemed not to notice. As hostess, Jen was unsure what to do.

After a few seconds of uncomfortable silence, someone fumbled about asking an additional question. Then another, much louder noise filled the room as Leslie proceeded to answer. "Were the tamales upsetting his stomach, or was the scotch not settling well with him? Jen thought". This "noise" was unmistakably "toots" which continued for at least five minutes. The room was becoming quieter and quieter and the toots were becoming louder and louder. Just as Jen and the others were about to melt into a pool of embarrassment, Leslie tossed a pink whoopee cushion onto the table and said, "relax people, it's only a fart". It took a few seconds and then the group busted out in laughter, which lasted for the rest of the evening. Jen and her friends had not poisoned poor Mr. Nielsen's intestinal track but instead were the butt of a very well played old, old gag. Jen's one word in remembrance "thankfully."

The gag continues: When invited to the Boise Idaho, Treasure Valley Beekeepers three-day weekend event, the informal gathering of members began to "toot" first one, then another during the "welcome" dinner in which Jen was present. Jen, only having just met them, and not knowing that they are just your usual, fun loving group of beekeeper crazies, didn't know they had gone out and purchased some whoopee cushions. They eventually fessed up and the busy weekend of one bee activity after another got off on the right foot. They loved Jen and she loved them. They learned a lot and they entertained her in great fashion. Check out her December 2018 Bee Culture interview of the club; one recommendation, if you too have a bee weekend and you want the perfect speaker – think, Jennifer Berry. And have someone bring a whoopee cushion – 3rd times a charm!.

Jen wrote in the 2018 interview issue (she interviewed nine individuals of the Treasure Valley Beekeepers): "The December issue is one of my favorite articles to write, not only because I get to feature someone special, but also because I get to know this person even better." I certainly second that sentiment. I hope you too have the opportunity to get to know Jennifer Berry better!

Jen keep up the great work and good luck with the PhD. BC

An Interview With Dr. Judy Chen

Jay **Evans**

This month I was eager to interview my great USDA colleague, Dr. Judy Chen. Judy and I have worked together for nearly two decades and are now the 'old guard' of the USDA-ARS Bee Research Laboratory in Beltsville. I have always enjoyed Judy as a generous and wise colleague.

Where are you from originally?

I was born and raised in the southern part of China, in the Hunan province.

How did you get interested in science?

I have always had a love of insects. My parents told me that, from the time I was three, they would find me outside playing with worms and other bugs for hours. Then, when I was 16, the universities in China finally re-opened after the end of the cultural revolution and began admitting students again for the first time in a decade. I was fortunate to pass the competitive college entrance exam and was able to enroll as a student at the Hunan Agricultural University, which allowed me to take my first step down the path of biology and agricultural science to where I am today.

Where did you go to school and what did you study?

I obtained my Bachelor's degree from Hunan Agricultural University majoring in Entomology and Plant Pathology. In order to further my education, I came to America to pursue my graduate degrees. I obtained my Master's degree in Entomology from Brigham Young University, and my Ph.D. degree from Texas A&M University, also majoring in Entomology.

How did you start your career after school?

After I graduated from college, I worked for several years as an extension entomologist at the Hunan Academy of Agricultural Sciences in China. In this position, I was responsible for helping growers and farmers implement non-chemical pest management methods developed in the lab in their day-to-day farming practices to help protect their crops. This extension experience really showed me the importance of the interactions between a research project and its stakeholders, and drove home the need to conduct meaningful research to help solve real world problems.

After getting my Ph.D., in an effort to expand the scope of my research experience, I dedicated several years of post-doctoral research in the medical science field, as a postdoctoral fellow at the University of Maryland Medical School's Institute of Human Virology, and then as a research fellow at the National Institutes of Health (NIH). All of these working experiences led directly to my joining the USDA-ARS, first as a postdoctoral fellow and then a research scientist at the USDA-ARS Beltsville Bee Research Laboratory (BRL) studying honey bee viruses. I have worked at the Bee Lab as a bee pathologist since 2002.

Which hot topics are you studying now?

Along with my colleagues at the USDA-ARS Beltsville Bee Research laboratory, my research focuses on the underlying mechanisms of various stressors including parasites and pathogens, pesticides, and nutrition and on how they drive honey bee population declines. We are also interested in the identification of new emerging pathogens in honey bees, and development of novel diagnostic, prognostic, and therapeutics for honey bee diseases.

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

I have been fortunate to travel to many countries around the world studying honey bee diseases. One of the most memorable trips was a visit to the northwest region of China, Xinjiang Province, during a summer week to investigate the incidence and prevalence of pathogens and parasites in local bee populations. During that year, heavy *Varroa* mite infestation led to the loss of 85% of the honey bee colonies in this region. But we heard from a local governmental officer that a few apiaries run by one beekeeper and located in a remote mountain area had no problems with mites of any kind, despite the fact that he never treated his hives for Varroa mites or other pests over the past decade. We were warned that the beekeeper did not welcome any visitors, but we managed to track him down and convince him to allow us to take a look at his bee hives. Everyone in the team was astonished by the robustness of his colonies and by the fact that not a single case of Varroa infestation was identified in the apiaries we inspected. The tactics that the beekeeper had employed over a decade for keeping purebred Chinese black bee populations (*Apis mellifera mellifera*) included strict geographic and reproductive isolation to prevent hybridization with any other subspecies and selective breeding of local bees. I have always wanted to go back

to visit his apiaries again to gain more insights into the underlying mechanisms of *Varroa* resistance of Chinese black bees.

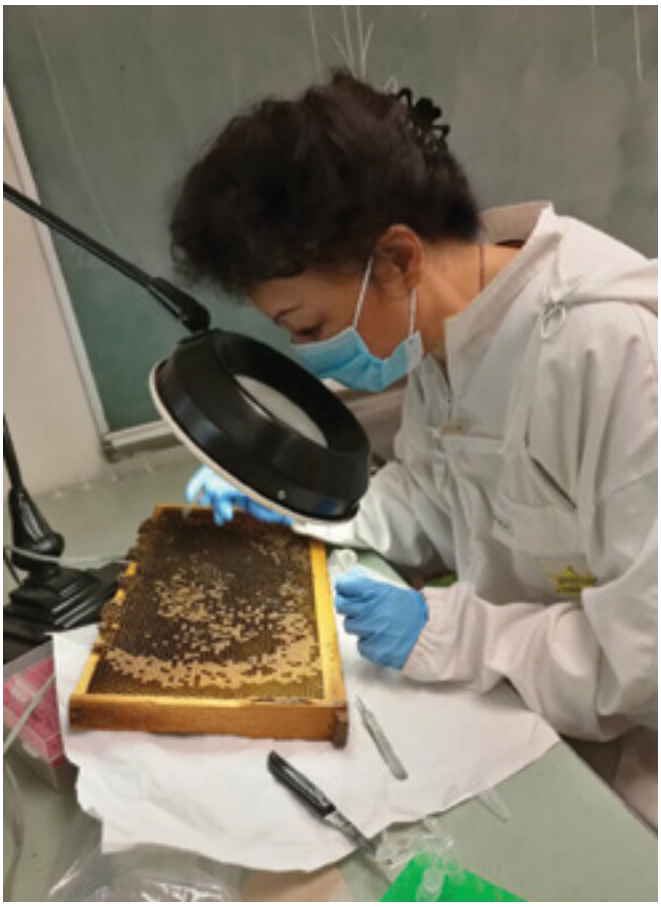
What are the biggest challenges facing beekeepers moving forward?

The current worldwide outbreak of COVID-19 serves as a warning that the outbreak of emerging infectious diseases (EIDs) represents a continual challenge not only to humans but also non-human species like honey bees. Honey bee Colony Collapse Disorder (CCD) is a prominent case of a honey bee emerging disease with devastating impacts and the same problem may come back in different forms. We must continue to fill the gaps in our knowledge concerning the dynamics of infectious diseases and the means of contracting diseases in order to better prepare for future emerging disease outbreaks.

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

One thing that gives me hope is the incredible speed of scientific and technological breakthroughs that enable us to imagine a new future. And, the creativity and energy of the young people that I have had opportunities to interact with give me hope and inspire me every day.

Over the past decade, scientists around the world have made remarkable progress toward understanding honey bee population declines and enhancing colony health. For instance, genetically engineering gut bacteria to tackle diseases in honey bees, use of artificial intelligence to monitor honey bee health, etc. Of all the amazing discoveries in bee science, I wanted to mention the creative work from our lab of using a detoxifying strategy to scavenge the pesticide residues from hives and bees to safeguard bee health. This remediation strategy, which depends on a safe food additive, has the ability to scavenge toxins from both pesticides that are purposely administered to beehives for controlling parasites and pests as well as neonicotinoids that get into the pollen and nectar that are brought back to beehives by foraging bees. My former postdoctoral fellow, Dr. Matthew Heerman, was the primary inventor of this incredible discovery. Matt unfortunately passed away two months ago due to an illness, but he will live on through his significant contribution to the vitality of the beekeeping industry.



Any advice for future scientists?

Be creative and think outside the box for solving health problems of honey bees and other pollinators.

Do you have hobbies and other interests beyond bees and science?

Outside of work, I enjoy reading, hiking, cooking, and travelling. I get very creative in the kitchen and always want to try out new recipes or come up with my own recipes. My husband is my favorite guinea pig for my culinary experiments. Traveling is a great way to discover new cuisines, which always excite me. And, I have two lovely grandsons who have brought tremendous joy to my life. When I am not at work, I love to spend time with them. BC

Dr. Jay Evans will be handing over the Research Leader position for the USDA-ARS Bee Research Laboratory in November. He will return to his role as a Research Scientist focused on managing a variety of bee diseases. As Jay says, he did not sign up to be a lifer in this position but has thoroughly enjoyed the chance, through hiring and supervision over the past six years, to keep Beltsville as a leader in managing stress and disease in honey bees. He looks forward to more time to be a better scientist and collaborator, especially for large ongoing projects to identify and develop new, safe, bee disease treatments. Dr. Judy Chen, a longstanding Lab member and world expert on viruses and nosema, will serve as Acting Research Leader for the Lab.

My Day With Sam

Jennifer **Berry**

Sam Droege, Wildlife Biologist and World-Renowned Native Bee Expert

Izzy Hill and Sam Droege at the USGS Bee Lab.

Honey bees have been a passion of mine for over two decades. During this time, I've noticed other bees of course, but my focus was aimed strictly on *Apis mellifera*. Recently, however, I've been introduced into a new world; the world of native bees. This is partly due to a research project that I've become involved with and partly due to my own curiosity. Since transitioning our farm into acres of pollinator habitat, I've been witnessing an array of different types of bees. I've really enjoyed watching what kind of "new" bee will appear on the asters, golden rod, Mexican sunflower or camphorweed. Some I recognize (common names only), but most I have no clue. This curiosity has opened a door that I never saw myself walking through, so, when I decided to take on a research project that included identifying thousands of bee specimens, I realized I was going to need help because native bee ID is NOT easy.

Chatting on the phone one day about my research objectives with my good friend and USDA's Honey Bee and Pollinator Research Coordinator, Izzy Hill, she suggested that I needed to meet her friend Sam. During our conversation, she sent the first introductory email, "Hey Sam, this is my friend Jennifer, Hey Jennifer this is my friend Sam". I, of course being immersed in only the world of *mellifera*, had no clue who Sam was at first. I just assumed he was a bee nerd like myself. So off I go with my chatty emails to Sam about my research, who I am, what my favorite colors are, how I like owls, and would it be possible to come hang out and learn all there is to know about native bees. You know the usual "I am so clueless" emails. It was a bit embarrassing when I realized I was emailing Sam Droege, wildlife biologist and world-renowned native bee expert with the USGS Patuxent Wildlife Research Center. Yes, that Sam! Head in hands . . .

Floweres at Sam's lab.

For those of you immersed in the world of native bees, or who are native plant advocates, or transitioning to native landscapes, or fans of frogs, flowers, birds and amazingly cool insect photos, then you more than likely know Sam Droege, or have at least come across his name. Sam has devoted his life to learning, identifying, educating, conserving and photographing life here on our planet, both flora and fauna. It took me days to fully understand all that he has accomplished, the impact he has made and how important his work has been, and is. But did you know he started out studying birds, then frogs, then butterflies? Here is a minor snippet of his background before we move into modern day.

Sam grew up in the blue-collar suburbs of Maryland. Fortunately, there were woods, and a river near his home, since like most of us from that generation, we preferred to be outdoors. Back in the day, the 60s and 70s, there wasn't too much to keep kids entertained inside, at least for this kid. Computers hadn't become common or even accessible, and there were what, three or four channels on TV. I remember the only thing worth watching as a youngster was Saturday morning cartoons, the Partridge Family et. al., Star Trek and Creature Feature with Dr. Paul Bearer. Slim pickings for kids today, but that didn't matter for us nature nerds. Outdoors is where our adventures began.

One show I had forgotten about, until Sam mentioned it, was *Mutual of Omaha's Wild Kingdom*. We both agreed that the naturalist Jim Fowler and Marlin Perkins were so cool to us. Their adventures took them to far off places, countries foreign and magical, with animals so amazing and wild. Best of all, their job was playing with nature! How awesome would it be if, when we grew up, we could be just like them and get paid to work with, play with and immerse ourselves in nature? Sam admitted, this suburban kid is doing just that.

In his early days, when he would break away from the outdoors, Sam would find himself in the library looking at

pictures of plants and animals. He did not have access to field guides, so the library was where his other adventure began. He recalls getting his first look at the world of birds when this amazing book appeared in his home, *Birds of the Eastern United States*. Thumbing through the pages, seeing the photos, Sam became enthralled with birds, but this book was not allowed to venture out of the house. He needed a field guide, something he could take with him while observing birds in the woods. He came across a book, *Birds of Maryland and the District of Columbia* By Robert Stewart and Chandler S. Robbins, which would be perfect for his bird watching, but he couldn't find a copy anywhere because it was out of print.

Sam decided to write to one of the authors, Mr. Chandler Robbins, who still resided in the area. He did some investigative work by looking him up in the DC white pages in the telephone book, got his address and wrote him a letter. Surely, Sam thought, he would have a copy in his basement that he would be willing to sell. The letter, at first, didn't make it to Chandler, but instead to his cousin. Thankfully, the two cousins were in contact so the letter was forwarded to the correct Robbins. Weeks later, Chandler wrote to Sam explaining there were no such copies of this book tucked away in his basement but his wife Eleanor was involved in the bird club at the Patuxent Wildlife Research Center. This was the connection he needed and one that would change his life.

Sam quickly became a fixture at the center, helping with numerous projects, one of which included banding birds. Over time, his love for birds turned into a job since he had become proficient at identifying birds solely by their individual calls. After completing his MS from State University of New York, Sam went to work for the National Biological Survey developing Bird Breeding surveys. This federal agency, within the Department of the Interior, was formed to help understand the science and technology needed to conserve our nation's biological resources. As Sam put it, this was his first introduction to bureaucracy, which he didn't like. Fortunately, he was asked to come back to Patuxent Wildlife Research Center, which he much preferred.

Once there, he began to design and develop survey programs for plants and animals. At first, when I was chatting with Sam, I didn't fully understand exactly what he was doing. Surveys? I was stuck on the person to person surveys, as in, "Who do you plan to vote for?" or "At what age did you stop believing in Santa Claus?" Not the surveys in which scientists track through fields, forests and streams to monitor wildlife populations, or habitat. But once I made the connection it became clear. While at this job, he wanted to focus on animals that needed the most help and at the time he settled on frogs and amphibians. FrogWatch USA, was a product of his work. It is a monitoring program born out of the concern for declining populations where scientists and concerned citizens can, and have logged thousands of pieces of information about frogs and toads.

Once the FrogWatch USA program was up and running and then in the hands of the National Wildlife Federation, it was time to move to another project. Sam was always asking questions about wildlife, where were problems occurring, where were the areas of concern, where was he needed most? He decided to shift his attention to butterflies, but soon realized the North

Sam identifying native bees.

American Butterfly Association was cranking up, so a national survey was not really needed in that arena. However, one was needed for our declining native bee population. Once he realized native bees were his new mission, he headed off to the USDA Logan Bee Lab located in Logan, Utah. Here is where he began to immerse himself in everything about native bees. Over time, his passion for native bees has made him a leading expert in the area of native bee id and conservation.

Back at Patuxent Wildlife Research Center, he tried to get folks interested in bee collections and sampling, but the government didn't want to fund bees at the time. He then decided to work with different groups whose objectives were not to do research necessarily, but instead, to monitor bee populations. He began by

Close up of identifying native bees.

developing survey tools that provided information about our native bees. Next, he began to teach folks how to ID bees, and to also help them with their own bee collections. It didn't take long for his lab to become more of a support lab, for researchers and the public as opposed to strictly a research lab. In this world, there is no pressure to publish, instead his energy is available for educating about the fabulous world of our native bees. He used to teach numerous bee ID workshops, which would last a week to 10 days, but found it was better to work with people one-on-one. Apprenticeship works best, however, the workshops developed lots of friends, whom are continuing to monitor and ID bees. More importantly, they are spreading the word about native bees, their impact, their decline and how we can help!

Why so much concern? There are roughly 4,000 species of native bees in North America. There are bumbles, sweats, diggers, leafcutters, and miners to name a few. And out of the 4,000, around 25% are specialists, which is why some are in grave danger. Specialist bees are dependent on only a few or just one native plant species for their pollen needs. The flower/s and the bee have both evolved together, each providing something to the other, pollen to the bee and pollination to the flower. However, being a specialist is hard in this day and age. With large sweeps of land being cultivated, or cemented, native plants are disappearing, plus with the introduction of a wide range of non-natives, which may outcompete our native plants; well, you can see the problem. Here at our farm, we experience this issue every time we go to war with privet. Chinese privet was brought here as an ornamental and for hedgerows; however, nothing seems interested in eating it, disease, bugs, or herbivores alike. Therefore, it can quickly take over fields, roadsides, empty lots, and forests. While it marches on, uninterrupted, it is pushing out native vegetation, and hence our native bees. It took me years to fully comprehend this delicate balance and why there has been such a push for native plants. Ahha I get it now!

Honey bees, on the other hand are generalists, so, whatever sweet, tasty nectar their tongue can reach, they will gladly slurp up and take home. Some of the native bees, however, can't take advantage of any ole flower they're not accustomed to or evolved with. In other words, they don't fit with one another, the flower to the bee, the bee to the flower.

Here is a short excerpt from Sam's TEDxWashingtonSquare Talk back in 2017 titled, "Rewilding Your Land: Blessing of the Bees" in which Sam explains this relationship. "Wildflowers come in many sizes and shapes. We know a lot about wildflowers, a lot more than we know about our native bees. The size and shape of wildflowers exist because of the collaboration between the wild bees and the flowers. They are "fitting" so to speak, to one another. The architecture of the bees, these wild species, mirrors the architectures of the flowers themselves."

Sam graciously invited me to his lab back in September to help me identify specimens in my native bee collection. It was like walking into Disney Land or Daisy Land for this plant-a-holic. As I stated in a few issues ago, nothing (other than my husband and my dog) makes me happier than planting and cultivating flowers! And here was another "flowerscaper" who gets it. It's not about manicured grass and perfect edges. It's not about one shade of green and balancing colors, textures, heights and shapes. It's about letting natural, native, nature take back the land. As we walked around looking at all the different flowering plants and shrubs surrounding his lab, he talked about the importance of conservation for preserving our native bees and wildlife. He explained easy ways to flip a traditional grassed landscape into one that supports pollinators and more specifically, our little specialty bees. He showed us how he uses mulch to blanket and choke out grass. Then one can come back and easily plant perennials and annuals for bees.

Sam's photo of the Asian Giant Hornet.

Not only does Sam talk the talk, but he also walks the walk. After a long day of entering data into Discovery Life, we drove to Sam's farm outside of DC. It was a lovely space, purposely overgrown with native vegetation. He calls it re-naturalized "beescapes". As he delicately puts it, and I agree, "grass sucks!" "We need flowers, biodiversity, plant diversity, native vegetation instead of lawns which don't do a thing". Over time, he has allowed the native vegetations to take back the land. He is returning the land from invasive to native. He also encourages everyone to let nature take back some of the land, along roadsides, parks, playgrounds to name a few and to do it with a purpose. That purpose is to feed bees, provide habitat for wildlife and encourage others to do so. He also encourages people to transition "lawnscapes" into these beescapes because our landscapes are being simplified and homogenized which will not support bees, pollinators, birds, or wildlife. He stresses that we need to think flowers, not grass, blooms not blades.

I learned a lot during my week with Sam. Returning home, I have even more motivation to plant even more flowers, to work with our little town of Comer to convert lawnscapes into edible forage and to keep pushing UGA to become a part of Bee Campus USA. I also learned a bit about Sam. You could say Sam is a maverick, a nonconformist, a free spirit, one who colors outside the lines, but if you ask him, he will proudly smile and say he is just a bee nerd, nothing more. I say he's all of those things, but more importantly, he is a giver of knowledge, of time, and of expertise. He is a lover of bees, of birds, of conservation, of life, of developing beescapes and the natural, native world. We need more Sam's on this earth. Think of how beautiful it would be, for us, and the bees…

If you love photographs of bees and insects check out **https://www.flickr.com/photos/usgsbiml**, which includes hundreds of his images and are downloadable and available for the public. Again another gift from Sam! Thank you! BC

Blane White Interview

Ed **Simon**

Blane White introduced himself to me early in 2009 when he was setting up beeyards to be surveyed for the USDA Honey Bee survey. Since then I have seen him every year for the survey along with occasional presentations when he gave the SEMBA (South East Minnesota Beekeepers Association). He has impressed me with his in-depth knowledge, professionalism, and dedication during each interaction. I always came away with both additional and a better understanding of beekeeping.

Q: Blane how did you become involved with beekeeping as a profession?

A: I started beekeeping in the mid 1980s shortly before tracheal mites were known to be spreading in the U.S. and before *Varroa* had been found in the U.S. During that time, I was working at a college as a laboratory assistant in the biology dept. I had Summers off which give me the time to pursue beekeeping as a hobby.

In 1988 I was hired as a Summer apiary inspector for MN Dept. of Agriculture. During this time, I set up the Minnesota portion of the national survey for *Varroa* mites. The mites were first found in 1987 in WI and FL. I first found *Varroa* in an apiary in southwest Minnesota in August 1988. In May 1989 I was hired by MDA as state apiary inspector to replace the retiring inspector.

I have kept a few colonies of bees during all this time and have seen beekeeping change from both the perspective of a beekeeper and apiary inspector and now back to a beekeeper. I have been doing the apiary sampling as part of the National Honey Bee survey since MN first started to participate. I currently do a couple of interstate health certification inspections a year for beekeepers who request inspection so they can move bees to other states.

Q: What is your current beekeeping status?

A: Currently small. I have three colonies with honey supers on now. I divided some 10 frame boxes during the Winter and am trying to learn how to overwinter double four frame nucs in those boxes. Also have some five-frame nucs being prepared for wintering. I'm always learning and trying new things to make my beekeeping more sustainable.

Q: What was your worst disaster with your bees?

A: Other than complete Winter kills, I'm not sure. I have had a few adventures along the way. I had a bear find my hives one year. What a mess! At one point with one or two colonies in the back of my car, a driver stopped at the freeway exit where I was getting off the highway waving wildly to shout out the window that it looked like I might have a bee in my car. Little did they know that I had thousands of them and a few managed to escape my attempts to screen them in.

Q: What do you consider your most fulfilling success with bees?

A: Having colonies thrive and produce a nice crop and Winter well is always encouraging.

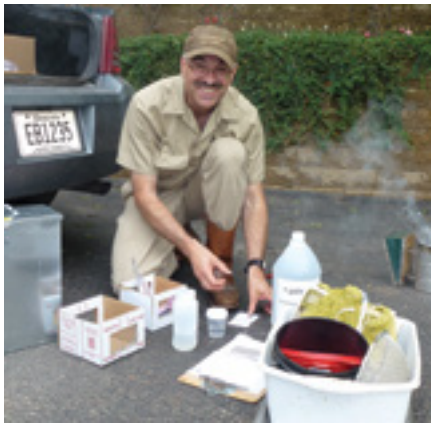
Also, I really enjoy being able to help beekeepers with disease problems, deal with them properly and see them move beyond the situation and continue keeping healthy bees.

Q: What is your role in bee education for the state?

A: Currently not very much. I do volunteer with the bee class at the Univ. of MN and do a demonstration with some AFB (American foulbrood) infected combs to expose the students to the disease and talk about how to deal with it and emphasize the importance of starting out with new equipment to avoid AFB.

Q: In your opinion, what is the greatest threat to bees and beekeepers today besides *Varroa*?

A: The tremendous increase in agricultural pesticide use since 2000. I know it started in the 1990s but the increase during the last 20 years is pretty amazing. There



are now many monitoring studies looking at insect abundance and diversity from many parts of the world and all show long term large declines in insects pretty much across the board with a couple of exceptions. In many places the crop pest increases are mostly the result of pesticide damage to their natural enemy populations. All pollinating insects are in steep decline but only honey bees are parasitized by *Varroa* mites, so the problem isn't the mites, it is some environmental factor that is impacting all the pollinators.

Q: Over the last 20 years, what has been the most significant change for the better that has helped the beekeeper?

A: Probably the increase in the awareness of our dependence on insect pollination and a general interest in keeping bees.

Q: How have you changed your beekeeping habits/methods over the last twenty years?

A: I have increased my queen rearing and colony splitting. I'm experimenting with wintering smaller colonies in smaller boxes. In part to help manage winter losses. I am more focused on sustainable beekeeping.

Q: What types of education are lacking for the new beekeeper?

A: I think the most difficult and lacking thing is hands on beekeeping experience. Many beekeeping groups offer mentoring programs to try to help address this. But it is hard for new beekeepers to learn that the bees don't read the books.

Q: Is there a trend or direction that you see beekeepers taking lately that will help beekeeping?

A: I think the increasing focus on sustainability is good and will lead to better beekeeping down the road. It is hard at first but things like wintering improve when one starts to raise their own queens.

Blane, thanks for this interview. I know we have only scratched the surface of your knowledge and experience. BC

Kirk and Sharon Jones

The Michigan Journey

Ross **Conrad**

A couple years ago I had the good fortune to be able to attend the first ever, Northern Natural Beekeeping Conference, held in Benzonia, Michigan. The conference was sponsored by the Benzie Bee Guild and held in conjunction with Grow Benzie whose mission includes increasing access to healthful foods, jobs, life skills, and each other by providing a community place that supports and nurtures these activities.

If you have ever been to Northern Michigan you know what a beautiful part of the country it is. The conference was held on the grounds of St. Ambrose Cellars, a meadery that is the brainchild of Kirk and Sharon Jones. I later learned that St. Ambrose Cellars was not the start of Sharon and Kirk's efforts but simply the latest in a long and winding road of bee related enterprises and adventures that, as they tell it, got its start in the late 1970s.

Kirk Jones: "*When I was a kid, I lived by the bayous of Louisiana, and spent a lot of time crawfishing, hiking, and exploring the woodlands. One day I discovered a fallen hollow log with clouds of bees and was mesmerized by the calm hum and the rich scent of the beeswax and honey. This early fascination evolved into an opportunity to purchase two hives over 40 years ago that has grown into a lifelong pursuit of commercial beekeeping for Sharon and myself.*"

Sharon Jones: "*When Kirk and I were married in 1979, we started a large garden at our little homestead in Honor, Michigan. We bought our first couple hives and met our mentor Oral Kuch who had raised bees there his whole life. We read everything and spent time just observing our new little families coming and going. I will never forget our first swarm and climbing a cedar tree armed with a pillow case behind my new husband, questioning if I was willing to follow him anywhere.*"

That first swarm eventually led to the development of Sleeping Bear Farms, a seven to eight thousand hive operation that ranges between Florida and Michigan. Dave Nesky manages the Michigan bees, while Jason Favreau and their son, Travis Jones, manage the Florida bees. The couple first started taking their bees down to Florida around 1992 in order to survive after severe mite devastation. The warmer climate and longer days allowed their bee's greater access to nectar and pollen and provided more time to make splits and treat when needed.

Kirk and Sharon Jones of Benzonia, Michigan pause mementarily for a photo in front of their skep bees located in the gardens at St. Ambrose Cellars."

BeeDazzled was born as an offshoot of Sleeping Bear Farms as Sharon began to develop beeswax products, including candles, soaps, and bodycare products from the copious amounts of beeswax available. Sharon manages the daily operations and is the prime creator of new products.

SJ: "*We started out as Jones Bee Yards in our garage and date night typically would find us bottling honey or building equipment. We were both very hands on and enjoyed just beeing together. As I took on distribution and accounting, so I could be with our children more and put food on the table, Kirk was handling the bees primarily and we continued to grow. I started BeeDazzled in 1984 when I began to make candles for our co-op (Oryana) and craft fairs. BeeDazzled Gifts from the hive is a small cottage industry which led me to developing the line of soaps, skincare and aromatherapy which has a large following.*"

KJ: "*We originally lived in a log cabin and used the garage to harvest the honey and pack it for our local food co-op. The candles were dipped on a wood range and hung over the washing machine. Sharon kept her Teepee in the backyard for summer quarters. It was the era of back-to-the-lander's inspired by the likes of Mother Earth News. Our first honey sales were delivered in our Dodge Dart with the back seat removed to accommodate the cases of honey.*"

Kirk had an interest in making honey wine and over the years had a few successes, which led to encouragement from friends and family to make it available to the public. Some of their early meads were more akin to rocket fuel and they still chuckle about that. In 2010, they applied for a federal permit and St. Ambrose, the patron saint of beekeepers, as the name of their enterprise. They hired experienced winemakers, trained at Michigan State University, to develop and produce their beverages. Nowadays,

the meads produced are much smoother.

Following the success of St. Ambrose's mead, Sharon and Kirk began to make red and white wines from high quality Michigan grown grapes, as their winemakers had the experience and desire to do so. One of their mead-makers, Nate Ely, was also a very accomplished beer brewer, so beer was added to their offerings. St. Ambrose's patrons nicknamed it Brose beer, so they adopted the name. Some of their beer contains honey, which is known by the "old world" name, Braggot.

KJ: *"In 2010, we obtained our Federal TTB permit to make mead, or honey wine. We quickly outgrew our Michigan honey facility and purchased the neighboring farm to build the present tasting and production room for St. Ambrose. In 2015, we obtained our beer license to make Brose beer to pair with the mead. Then the winemakers we had hired segued into red and white wine production from grapes we purchase. It takes about 45 people to keep everything going."*

Meanwhile, Sharon has her own bees to play with.

SJ: *"My approach at home is based on natural beekeeping principles and I personally keep around 25 hives plus the 6 hives at Grow Benzie. My bee yard is separate from our Sleeping Bear Farm bees and is a good pilot yard for applying organic mite controls, examining the results, and following queens."*

Like other businesses, the couple has had to adapt their business strategies in order to cope with this year's new Covid-19 realities.

SJ: "*At Grow Benzie we started out with only minor losses this year, only to have a bear come in and take out a hive in June. The drought in July had an effect on our crop, as well as the star thistle weevil which has become more prevalent here in North West Michigan. BeeDazzled has adapted to Covid by offering online ordering as well as curbside pick-up. We are experiencing some supply/demand challenges with packaging and ingredients, but have been able to maintain most of our products."*

KJ: *"We started out the year with plenty of healthy bees to ship to California for Almond pollination and left some at our Florida farm for Sharon and the girls to make up new queen cells for splits starting in February. We make new hives up every year in the panhandle of Florida, which has multiple successions of blooming plants with ample nectar and pollen to make increases and make good quality honey. We take our best hives to river and creek locations to make Tupelo honey, which has been less predictable over the years, but enough for our website and Amazon demand. After Almond pollination, we shipped most of the bees to our northern Michigan headquarters to stage for cherry and apple pollination, which has been very steady over the years.*

"Sales of our packaged honey was phenomenal during the Covid shutdown with many people shopping online. We could hardly keep up with the orders. Our sales have grown steadily over the years and we have had to purchase honey from other local beekeepers to meet demands, including this year.

"Sales at St. Ambrose Cellars, our meadery/winery/brewery were very strong after we re-opened on Memorial day. We adapted to the Covid restrictions and added many more picnic tables for our visitors to enjoy our beverages outdoors and changed to table service only, instead of using the tasting room. The response was positive and we have surpassed last year's revenue.

"The distributor sales are at about ½ of last year's numbers, but showing signs of life after our introduction of canned draft mead that is bolstering our bottle sales. I think most of this is due to bars and restaurants operating at half capacity, if open at all."

St. Ambrose Cellars also boasts a large post and beam barn (in background) that is available for special events."

Since Sharon and Kirk are each responsible for a different aspect of their growing business empire, they have varied answers when asked about their biggest challenges.

SJ: *"It's challenging to balance bees, my shop and the mentorships with good timing which is everything, and leads to responsiveness to the bees, mites, and whatever this bee season is bringing. I plan to move BeeDazzled to St Ambrose in the next year which will help to consolidate businesses and to work more closely with other family members. Our daughter came on board this Summer as GM for St. Ambrose operations, our Granddaughter is stepping into BeeDazzled customer service. This enables Kirk and I to maintain envisioning and be hands-on throughout the entire operation."*

KJ: "*Our biggest focus and challenge is keeping the bees healthy. Mite control continues to dominate our concerns."*

The couple also focuses on different areas of their businesses when reflecting on their biggest successes.

SJ: "*Since 2003 Kirk and I spend our winters at our southern bee ranch in the panhandle of Florida making increases and I am primarily focused on queen rearing. I run a huge 100 hive queen raising beeyard and enlist help from my students and friends which*

is part of their continuing education or collaboration. We raise thousands of queen cells in a season which is truly the heart of our operation. I love working with the queens in a feminine centric way and am continuously amazed by the cooperation from the bees when we focus on a caring relationship and being truly present in the yard."

KJ: "*I consider ourselves fortunate to have survived the economic pressures of the very low honey prices offered in the previous decades and the harsh impact of the Asian mites afflicting our honey bees. Almond pollination has been a welcome source of revenue that we have used to reinvest in new equipment and most importantly, better pay for our staff, including benefits of health insurance and 401Ks.*

"Over the years we have focused on diversifying our sources of income to provide more stability for our operational revenue stream. I think this may be one of our greatest strengths."

On top of all that they have going on, Sharon finds time to volunteer for the Benzie Bee Guild.

SJ: "*The bee guild was started by my student Jaime Pennington as her 2nd year capstone project, when she moved to NC I stepped in temporarily as the program is a pass it on program and I intend to do that when the time is right. Grow Benzie is located right around the corner so it's actually convenient for me and I have so much help from other local beekeepers. Participants in the bi-weekly hands on immersion are eager and committed to showing up and take ownership and pride in the project! Their excitement is really what carries it forward."*

So what's next in their beekeeping evolution/journey?

SJ: *"I am envisioning a queen rearing project based on bee's we have successfully overwintered for up to seven years now. I am looking to enlist some experienced students to help with it and it would also be a great source of continuing education. I think it's a niche that needs to be filled in our region. I get a lot of requests for mated queens, I think it would be empowering to teach people how to raise their own queens and have some on hand while promoting bee's that winter and perform well."*

Some of the brewing tanks behind the scenes at St. Ambrose Cellars.

KJ: "*We constantly have new ideas percolating around here. Our most recent project involves a medicinal line of CBD and honey and Sharon is working on a CBD beeswax ointment product line. We are trying it out for our aches and pains that are well earned.*

"On another note, we are going to employ our new canning line that we presently use for the draft style mead and beer, and can a honey-based energy drink with natural stimulates, vitamins, and adaptogens, like ginseng. So many ideas, so little time."

What keeps this dynamic duo going?

SJ: "*I personally cannot imagine life without honey bees. They are representative of the higher forces and enrich my life daily. I am passionate about learning to listen to them and sharing what I have discovered about the importance of our relationship with honey bees. I also believe mentorship is the best way to learn and have developed an 8 month apprenticeship program for women that takes them through an entire bee season. The second year graduates focus on capstone projects which led to our "Northern Natural Beekeeping Conference" last year featuring Ross Conrad as our Keynote speaker, as well as an ongoing mentorship program at Grow Benzie which is our local community development center. We pass the learning on, people of all ages are able to come and learn about beekeeping in our onsite yard twice monthly. This year we even had a grandpa and granddaughter team. I have found this to be a pathway for people just starting out to be highly successful with their first nuc's. There is so much knowledge out-there on the internet that can be confusing to people and lead to disastrous results for both the bees and their new keepers, our aim is building confidence and discernment with each mini workshop."*

This hive of friendly Michigan bees greets visitors to BeeDazzled's retail outlet."

KJ: "*The honey bees provide a link for beekeepers to experience the passing of seasons, with the flowers rising from deep winter into full bloom every year, giving us a compass for our activities. There is nothing like the heady scent of fresh nectar, beeswax and pollen when entering the bee yard on a sunny day with the hum of honey bees on a nectar flow. I'd like to bottle it for the winter months… We can't imagine a more interesting life than the path we chose to pursue beekeeping as a lifestyle and career. Beekeepers know it's mostly hard work, but the rewards of working outdoors and following the seasons is immeasurable."* BC

For more information visit ***www.stambose-mead-wine.com*** *or* ***www.beedazzled.com****.*

Kordick Family Farm – Piedmont, NC

Jessica **Louque**

Kordick Family Farm is a mother-daughter operation that was founded in 2009, when we planted our first 850 apple trees in Stokes County, NC. We primarily grow heirloom, cider, and regional apple varieties, with several grafted from local sources. You won't find any HoneyCrisp apples on this farm. Like many unconventional farmers, we have struggled with terminology that effectively describes our growing practices, while also communicating in a single word our management philosophy to consumers. 'Natural' and 'sustainable' mean nothing without context. 'Low-spray' can be used by growers who spray conventional chemicals, but at their lowest possible application rates. Most of the materials we apply happen to be approved by OMRI (the Organic Materials Review Institute), however, use of the term 'organic' implies certification, which we are not. We consider ourselves *beyond* organic at this point in our growing careers, and have finally settled on the term, 'holistic,' in the sense championed by Michael Phillips (**http://www.groworganicapples.com**). Growing apples is tricky enough in the Southeastern United States, and particularly challenging to those of us attempting to produce apple crops without the aid of conventional chemicals. Every year brings new and different challenges, and while we are continually experimenting in our efforts to be as holistic as possible in practice, and know we still have a long way to go before we are satisfied with our production system, we can say with confidence that we love the way we grow – our apple trees are unbelievably healthy and produce exceptional fruit.

Q: What brought your family farm to this area?

The fact that it was off the beaten path and happened to be a great location for an orchard. The gorgeous postcard view of Pilot Mountain as you cruise down the road didn't hurt in sealing the deal either. The Piedmont region of North Carolina is not the most ideal apple country in general, but where we are situated is technically in the foothills, so we're at a higher altitude and enjoy slightly cooler temperatures than the surrounding areas. The windy conditions are also appealing. As a local plumber friend is fond of saying, "There ain't nothing between us and the Blue Ridge Mountains but a barbed wire fence." At the very least, there is always some kind of a breeze blowing out here, and that constantly moving air helps to prevent fungal infections in the apples. We are also fortunate that we have several different microclimates on the property, so we can lay out the orchards in such a way that we are usually ensured some apples in the event of a hard frost, freeze, or disease outbreak since conditions are variable.

Cicada damage sign.

Q: Could you describe the approach you use to be as organic as possible in your apple production?

We have never had any interest in being certified organic; we're a little too contrarian to want to belong to any kind of a club. We maintain a list of everything we spray on our website, **www.kordickfamilyfarm.com**, so that people can decide for themselves whether or not we fit their definition of sustainable, organic, etc. We grow this way because we want to feel good about eating the apples we grow, and we don't want to feel that it's necessary to peel an apple because the skin is some sort of heavy chemical repository. Neither do we want to have to wear respirators and worry about chemical burns when we spray. Most growers, scientists and extension agents will tell you it's not possible to produce commercial crops of apples organically in the Southeast; the disease and pest pressure is simply too high. We aspire to prove them wrong, but it is a hard row to hoe. Organic chemicals and applications are typically more expensive, more labor intensive, and less effective than conventional chemicals. We currently have 18 acres of apple trees, with 10 acres bearing, but we have not even begun to see the type of crop yield that acreage should produce. If it was just about economics, we would go down the rows of trees and select the handful of varieties that do produce well under organic management for us, cut down most of the orchard, and replant with those few varieties. But frankly, we just don't want to; we're not fascists, and anyway, our farm motto is "We work harder, not smarter." So we try and up our management game a little more every year, reducing potential inoculum sources, and keeping the trees in as optimal overall health as possible so that they are not easily overwhelmed by the litany of pathogens and pests that thrive in the long, hot and humid Southeastern growing season. Spraying good stuff is only a small part of it. We work very hard to build and maintain our soil and orchard floor to encourage and supplement the natural bacterial and fungal networks in the soil, as they play a huge part in the overall health of the trees. We also wassail. Never underestimate the benefits (to trees as well as humans) of a good old-fashioned wassail.

Q: What's the hardest aspect of running an apple farm from the perspective of a business?

Effectively communicating to the customer how much work goes into the products. Like most farming ventures, but even more so with tree fruits that require months of

pruning work in the "off" season, as well as year-round care in general, it is really challenging economically to make sure pricing reflects all the labor you put into your crop. A fellow orchardist in Cana, Virginia is fond of recounting how customers routinely ask him what he does with himself after the apples are picked for the year. His standard reply is, "Why, I take a trip around the world, and just try and make sure I'm back in time to pick the apples next year!" In fact, for us the end of harvest means we begin preparing for next season's apples. After this year's crop is harvested, it's time to wrap up any of the year's loose maintenance ends (like mowing, or end-of-season sprays, or picking up all the drops, a major source of disease inoculum) so we can start thinking about pruning the trees, which for two people working 18 acres of large semi-dwarf apple trees, takes over four months (we've never actually managed to get all of our annual pruning done). We don't come anywhere near covering our labor costs, and so, like too many farms, as well as small businesses, have no recourse but to take the hit. But it's really frustrating when people who live and die by the standard 40-hour work week, who would not think of working without compensation, do not properly value our products or even take the time to try and understand what goes into them. We are chained by our love of this life and by our high standards, and sometimes it must be enough that we do appreciate the true value of what we have produced.

Q: Can you tell a difference in your yields when the trees are pollinated on-site?

Yes, unsurprisingly, fruitset is through the roof when honeybees are in the orchard . . . but that's not necessarily a good thing if you can't manage it. We have 170 different varieties, which means 170 different bloomtimes, so it is really, really difficult for us to thin our apple load in any efficient way. Typically, you wait for the main "king" blossom to be pollinated, then hit the trees with something to kill the rest of the blossoms in each cluster. If you have only a few different varieties, you might have to skip around your blocks a little to thin at the right time for each, but it's very doable. With our varietal diversity, we might need to thin 20 trees here, but we absolutely do not need to thin 20 trees there. Because thinning is so difficult to manage, with the exception of a handful of heavy-setting varieties, historically, we haven't thinned much at all. If honey bees have pollinated a significantly high percentage of blooms, and you don't thin, this can lead to heavily over-cropped trees, which in turn, can mean abnormally small apples, and might even trigger your trees to start bearing biennially. We've learned the hard way that thinning is a must if we've got hives in the orchard.

We also have very high fireblight pressure in our orchard, and bloom is the primetime for inoculation. Honey bees actually have the potential to harm rather than help yields if fireblight bacteria are present, since the bees serve as vectors and conveniently inoculate every blossom they visit. If an apple blossom becomes infected with the bacteria, it is said to be suffering from "blossom blight," and will wither and die without setting fruit. We want to ensure that as many king blossoms as possible are pollinated per tree, and a heavy population of honeybees at the right time is a big help in this regard. But similar to the thinning issues, management is crucial to ensure that blossoms are protected against the potential onslaught of fireblight bacteria spread by large numbers of honey bees working the bloom.

Brittany at their pack house and farm sign.

Q: Which varieties are the best to market and which are difficult? What makes you choose a variety?

Well, we're fairly contrarian in our varietal proclivities, as well. At a time when many apple growers are rotating a choice few varieties, particularly patented club varieties that have been exhaustively marketed to the public, on dwarf high-density plantings that are quick to bear and easy to rip out a few years later if another hot variety comes along, we are taking a longer view. All of our trees are grafted onto M111, a very hardy old-school rootstock that grows to 85% standard size (averages about 25-30 feet tall), and it takes more than a few years for them to hit their production stride, so we're not ripping them out, and hopefully, neither is anyone else, this side of 100 years old. As mentioned above, we currently have 170 different varieties of heirloom apples in our orchards, and that number looks to only grow as grafting season rolls around again. The original intent was to build a hard cidery, so many of our varieties are old cider varieties. We also have an interest in regional apples, and when we first moved out here, did the "Wanted: Old Apple Trees" thing and put up signs asking people with old trees on their properties to contact us so we could take cuttings. In this way, we obtained very localized favorites like "Horse," "Smith's Seedling," and "Buckingham." We're as bad as your average heirloom apple collector, just on a slightly larger scale -- we graft a variety because we like the story, or the name, or just because we don't have one. We won't think about finding room for more apples today. We'll think about that tomorrow.

Q: What does your pesticide regime look like in the blossom season and what are the factors that make you decide what you need to do?

So bloomtime is deceptively pristine in appearance and nature. While we're enjoying the beautiful and fragrant apple blossoms, we're not seeing the free-for-all fungal, bacterial, and insect pest pile-on that's just been waiting for the trees to roll out the welcome mat in the form of flowers, which serve as easy entry ports for pathogens and coincide with enough degree days for

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many pests to become active. Most eventual disease and insect issues have their roots in bloomtime, when trees are inoculated and eggs are beginning to be laid. So control really needs to happen during bloomtime if you have any hope of managing issues later in the year. The flowers are just gorgeous, but I have come to dread bloomtime. It's a nerve-wracking race to keep trees protected, and for us, a delicate balancing act of colonizing with beneficial bacteria to try and outcompete pathogens while needing to control any pathogens that have managed to get a toehold. After years of alternating expensive organic applications with seemingly little effect, the complications have become very apparent. A potential scenario: we're in full bloom, and the weather report is calling for two days of rain. We need to protect the blossoms going into this enormous potential for infection event, so we spray with EM-1 benefical bacteria or Serenade. But the rain is worse than we thought, and since conditions were perfect for apple scab, we need to cover ourselves by spraying something like lime sulfur after the rain stops to try and ameliorate any infection that did manage to overwhelm our beneficial bacteria. But the lime sulfur will also kill our beneficial, and expensive, bacteria, which means we want to reapply asap . . . but we have to wait until lime sulfur residue is inactive (and thus blooms are left vulnerable in the meantime) before reapplying bacteria. Then the rain starts again, and so goes the crapshoot for the month or so of bloomtime.

Of course, since bloomtime is also when pollinators are most active, we're also very sensitive to spraying anything that might harm them. Most of what we're spraying has not been shown to be harmful to pollinators, but a lack of a warning isn't always enough to make us feel good about spraying anything on trees that are loaded with bees. For example, during bloom we would prefer to spray pure neem oil, a primary component of our most frequently sprayed holistic cocktail (including EM-1 bacteria, seaweed nutrients, supplemental calcium and silica) but even though neem is touted as safe for pollinators, there's enough doubt in our minds for us to substitute the neem oil with karanja, another fatty seed oil, to serve as a beneficial bacterial food source while the trees are flowering.

Q: What else do you have on your farm for profit or for fun? – I'm really just asking about the goats here.

I know you're really just asking about the goats here, so yes, our self-control is often lacking where agricultural enterprises are concerned, and I'm afraid we do also have a goat problem to supplement our significant apple problem. Come to think of it, we also have a rabbit problem, as well; we keep pastured rabbits, though it's no more than a slight infestation at this point. Fruit-wise, we have a modest pear orchard that we are looking to expand, and since we can't properly manage everything else, of course, we are wanting to branch out with more extracurricular plantings of well, everything. Like figs, pawpaws, quinces and che fruit (aka melonberries, the next probable superfruit) . . . to name just a few of our weaknesses and intended future orchard plantings. One of us comes from a vegetable background, and is not very covertly tiptoeing back in that direction, so that we complement our apple crop with fall produce like pumpkins, Winter squash, gourds (including, of course, apple gourds), broom corn, and cool season vegetables.

Brittany and the goats.

We graft all of the heirloom apple trees we grow, and also maintain a small nursery of trees for sale to visitors. We make lots of value-added apple products such as apple cider syrup, apple blossom jelly, apple butter, applesauce, jams, and relishes, as well, and are really looking forward to injecting some New England-style apple culture into our little neck of North Carolina in future seasons. We would love to be able to make cider donuts on-site, and we have a 100 year-old rack and cloth cider press, probably originally run off a steam engine, that is just dying to be put back together when we can find the space and time.

Q: Where do you see your farm in 10 years?

Um, that's a good question. When we had to decide on a name for our orchard venture, we went simple and straightforward; we are a family farm, and we intend to stay that way. Both of us have trouble delegating tasks, and it's hard enough for us to work together, let alone manage a crew of any kind, so we intend to stay small and not grow beyond what the two of us can attempt to maintain. We can't claim to be a Century Farm handed down over generations, but we do also seek to honor the original Kordick Family Farm, started by my great-grandparents in the 1930s. They emigrated from Russia to a Connecticut mill town in the early 1900s, and like so many working families back then, in addition to their day jobs, maintained a farm that sustained themselves, as well as the surrounding community. It was primarily a dairy, and my great-grandfather would deliver milk and cheese in the wee hours every morning before he went to work at the brass mill. His children milked the cows and helped to make the cheese. Like our ancestors, we're doing this for ourselves first and foremost, and honestly, it's hard to imagine at this point what the farm will look like in 10 years. So many of our farming peers are being driven to agri-tourism in order to survive, and while we are encouraged that people are really starting to want to know where their food comes from, at the end of the day, we just want to farm, not run the farm as a sideshow attraction. BC

Tina Sebestyen

One Step, Then Another

Ed **Colby**

Tina Sebestyen first picked up a hive tool in 2007. We go back just four years, to when she and I got elected vice-president and president, respectively, of the Colorado State Beekeepers Association. Colorado bee politics almost immediately got complicated, so we hit the road together and rattled some cages. We became friends. But it never really dawned on me how accomplished Tina is, as a beekeeper, and a teacher, until her sparkling talk on honey bee queens at the American Beekeeper Federation conference in Reno in 2018.

Today you can read her how-to articles in nearly every issue of *Bee Culture* and *American Bee Journal.*

A voracious reader of bee literature and research, there is seemingly no beekeeping topic on which Tina does not have an informed opinion. Indefatigable in her myriad of bee-related projects, she states her work ethic unequivocally: "I never, never, never give up!"

I wondered how she got to where she is today, so I asked her.

Tina: My dad wanted bees, so for Christmas I made Dad a top bar hive. Then I found a mentor, and from that first day in the hive with my mentor, I loved it. Right after he got that beehive, my dad found out that he had cancer. Dad and I kept bees for a couple of years together. His last wish in his last year was a Langstroth hive. I called my mentor (commercial beekeeper) Bill Loomis, and he brought one over and dropped it off in Dad's yard. That was awesome! Dad died that Fall, and Mom would not let me feed Dad's bees, and they all died. That was doubly heartbreaking – to lose Dad – and his bees.

Tina Sebestyen conducting an apiary visit for the bee club she founded, Four Corners Beekeepers Assoc. (note what she is wearing, the bees got a little feisty that day, and they had to blow smoke up her skirt)

The next Spring, I went down and got the hives from Dad's house, and brought 'em up here. My neighbor had a swarm move into their soffit, and that was how I got my own first bees. I didn't have any equipment. I didn't know anything. I hadn't read about it. I just went up there and cut 'em out with a knife, and picked 'em up with my hands and put 'em in my hive and got stung like crazy, and that colony was great. They lasted five or six years, even with me as a beginner.

The year after my dad died, I said to (my husband) Neil, "It's great that Bill Loomis is there for me, but not everyone can have someone like Bill, so I think I'll start a bee club!" Starting a club (Four Corners Beekeeping Association) was the thing that lit a fire under my learning about beekeeping. Seven people showed up at the first meeting. A month later 15 people showed up, the next month 30 people, and we just started talking about bees together. People came to me and started asking me stuff, and I didn't know, because I was just a third-year beekeeper. I would call Bill, or I would go over to their hives, and I'd tell them, "We'll figure it out together." I saw a lot of things I would never have seen in my own colonies. Being mentored and mentoring others really accelerated how I learned beekeeping.

Then the bee club took over my life. We would bring speakers, and that's how I met a lot of the people I call mentors today – Dewey Caron, Beth Conrey, Ross Conrad . . . all these people who came to speak at the club and stayed at my house. I've become friends with them, and if I have a question, I write, and they answer my questions.

Ed: When did you go to work for a commercial beekeeper?

Tina: That would have been in 2015. He wanted to train someone to raise queens for his operation in the spring. His dad had done it for him but was getting older. He didn't know if I could graft, and I told him I could. He took me 12½ hours down to Texas and put a grafting tool in my hand and said, "Get to it!" That was a really great way to learn. It was his father who taught me. He had been beekeeping for 50 years, and he said, "Here, watch me do it," and I watched him for like two and a half minutes, and that was it. I could graft, and I knew I could graft, because he was working along with me. We marked all the frames, so we could tell which were

his and which were mine, and we could tell how many acceptances each of us had. That was really great for my confidence, and confidence is important in beekeeping and especially in queen rearing.

Ed: How did you get started writing and speaking about bees?

Tina: As secretary for the Colorado State Beekeepers Association, I was writing the news notes that go in the front of *American Bee Journal* and the meeting announcements for *Bee Culture*. Beth Conrey, the president of the CSBA at that time said to me, "You're a wordsmith." That's all she said, and in my mind I went, "Wow, that's really cool." It gave me the courage to try writing for *American Bee Journal*. They accepted my idea and I wrote my first article, which was super exciting for me. Then, from seeing my name in print, people started calling and asking me to speak.

Ed: What was that first article about?

Tina: It was about my observation hive – the interesting things you can learn from an observation hive. It's so exciting to see your first swarm take off! Cool stuff like that.

Ed: How did you learn so much that you were able to write for these respected journals?

Tina: A lot of it is through mentoring other people, and running into people who were willing to help and mentor me. And I read a lot about beekeeping. In fact, once I started beekeeping, I have really read practically nothing else, for the past 14 years.

Ed: Would you say you're obsessed with beekeeping?

Tina: It's more that I'm fascinated by the bees. When I teach my beginning beekeeping class, here's what I tell my students: "Looking into a hive is like looking into a mermaid world, where it's a totally different world from the one you're used to, and there's all these little creatures, and they're going about their lives, and everyone works together, and all the citizens eat flowers!"

Ed: Tell us about running the CSBA Master Beekeeping Program.

Tina: I'm laughing because I must have been wearing one of those t-shirts that say, "Sucker!" on it! I was on the board of the Colorado State Beekeepers Association. Someone on the board said, "We can't do this," and I said, "Yes, we can! I can do it." I ended up putting myself in charge. And not because I think I know so much about bees. Every year that I keep bees, I learn how much I don't know about keeping bees. Dewey Caron, and I don't say this lightly, is a friend. And I knew I could count on him to help me. He was involved in the Oregon State Beekeepers and the Eastern Apicultural Society Master Beekeeper programs. It was way more work than I thought it would be, even with Dewey's help. But I feel passionate about teaching other people how to be better beekeepers.

Ed: Do you have any secrets of time management that might help the rest of us?

Tina: I just do what comes up. I race around like a crazy person.

Tina grafting a few queen cells at home for her small company, Fat Mountain Queens at ***https://beequest.buzz.***

Ed: Doesn't taking care of all your pigs and cows and ducks and chickens take a lot of your time?

Tina: It really does. But you have to have your list of priorities. I need to feed my animals, and they need water, and they need good care. But the bees come first. I haven't shoveled out my chicken coop yet this Summer. But I was down there taking care of my bees today.

Ed: Do you have any tips for beginner beekeepers who are serious about learning the craft of beekeeping?

Tina: I do. One, join your local bee club – very, very important. That's where you're going to find a mentor to help you. After you get one year under your belt, you sign up to mentor somebody else. Because you know more than they do, and you're going to learn twice as fast when you see what's going on in their hives. And read everything about beekeeping that is in print. I'm not talking about what's online. Read *Bee Culture* and *American Bee Journal*, and bee books. Do these things, and you can be a great beekeeper.

Ed: You know, and I know, that beekeeping is not the road to fortune. What keeps you in it?

Tina: It's love. It's passion. It's the intrigue of beekeeping. There is always something new to learn. It's a lot like a chess game sometimes . . . the strategy of figuring out what the bees need, how to give them what they need, and I just love it! BC

Learning queen rearing from a 50+ year beekeeper really boosted her confidence, so she knows that when something goes wrong, it isn't because of the grafting.

Beth Conrey

Colorado Champion

Tina **Sebestyen**

I first met Beth Conrey when she was pursuing me. Or rather, she was pursuing my bee club. She had been elected president of the Colorado State Beekeepers Association in a rare, hotly contested race, as opposed to the usual election of officers to a bee club, wherein everyone is just glad someone else is willing to do all of the work. She suggested that our little bee club in Southwestern Colorado would do well to join CSBA as an affiliate club. As founder and president of 4CBA at the time, I resisted, fearing for our independence. She said either way, she'd love to come down and do a presentation for our monthly meeting. We were just at the stage where we had too many people to just talk about bees, but were still unofficial, had no dues and no money, and I thought a free speaker sounded great. Her talk changed my life, our club, and beekeeping in Southwestern Colorado forever.

Beth is passionate about formalized mentoring in beekeeping, realizing like each of us with at least five minutes of beekeeping experience how hard it is to be a successful keeper of healthy hives. She says that there are a lot of poor beekeepers out there, and there is a lot of negativity to getting to be a better beekeeper. Armchair diagnosticians throw stones, but don't give good advice. Bee clubs can go a long way towards remedying this with education and mentoring. She was recruited to be president of Northern Colorado Beekeepers Assoc. when she was only a 4th year beekeeper. She didn't know much about beekeeping then, but knew about organization. Once she had accomplished her goals at NCBA, she set her sights on the state organization, and brought her amazing work ethic to "make the state bee club relevant".

Beth's logo for Bee Squared, her honey business.

Her talk went way beyond that, though, delving into the expectations of a bee club and the needs of its members. There are five areas, she said, in which a good club needs to provide for its members' needs: the social aspect – some people really just want to come and talk to other beekeepers, education – teaching the nuts and bolts of good beekeeping, financial – with good deals on nucs and packages, lending of extractors and vaporizers, etc., political – putting our numbers to work in areas in which the law impacts beekeepers, bee health, the environment, and promotional – educating the public about bees, forage, pesticides, and all of the things that impact bees outside of what beekeepers are doing.

I realized that our club was barely scratching the surface of what we could be, and that I needed to go big, or go home. We started collecting dues, joined CSBA as an affiliate club, and got to work filling the needs of our beekeepers. Now our members have an impressive success rate with their honey bee colonies, we have a formal mentoring program, great educational events monthly, a spring seminar, and we are working as a group towards providing all of our bee needs, thus reducing the need to purchase packages and queens, while reducing the impact of imported bee pests and diseases.

In her six years as president of the Colorado State Beekeepers Association, she transformed it from a group of 40 beekeepers chatting over drinks twice a year to a vibrant organization that includes an average of 1300 paying members with a mailing list of over 2200, with thirteen regional affiliated clubs. There are two annual educational events, along with the Traveling Road Show, when a member of the Board of Directors will visit a regional club and guide a day of apiary tours. Beth got CSBA set up with a web page that is so full of great information it would take a week to read it all. There is also a state-wide swarm call hot-line that routes callers to affiliated regional club dispatchers who send out local swarm collectors.

Beth's strong suit is in the political arena, and during her tenure as CSBA president, she worked with several municipalities in Colorado to reverse beekeeping bans and unreasonable mandates. She played a role in the passage of the Cottage Industry Bill in Colorado that

makes honey sales possible for small producers (and was quite helpful to egg producers as well). After stepping down from the presidency of CSBA, she helped found the People and Pollinators Network (PPAN), and also serves as vice president and treasurer of the Pollinator Stewardship Council. With PPAN, she got I-76, which runs from Denver to Julesberg, designated a "pollinator highway".

All the while that she was working for the betterment of beekeeping in Colorado, she was growing her own truly amazing honey business, which is now nearing a half million dollars a year in sales. She says she got started when a company that supplied five gallon buckets of honey went out of business, and people started calling her. She quickly went through her own honey and decided that buying and selling buckets of honey was good business. She says that local honey is better than no honey when you don't have enough of your own honey.

When asked about her phenomenal success, she says she owes it to listening to the people. If someone asks for chunk honey, for instance, she says to herself that a lot of people would probably be interested in that, and produces what is asked for. She pours jars of honey from 1½ oz. all the way up to 60 lbs. to satisfy her customers wants and needs. Her Masters degree in business gave her a good understanding of the concept of branding, and she started with a professionally produced label, and built a gourmet honey business around it. Bee Squared Apiaries is the only Good Food Award winning producer in the state. Her rose petal infused honey, a wonderful collaboration with Happy Heart Farm, won in 2016. The Whiskey Barrel Aged Honey is the brainchild of her star employee, Jamie Erickson, and another terrific collaboration with three local distillers that won in 2020. Beth shares the proceeds of these collaborative efforts with the people that made them possible. She says that there are more benefits from generosity than from frugality, and that spending money to make money is always worthwhile. While her value-added products like soap and candles are only 15% of the business, she enjoys the reward of making high quality products available. All of this is much easier now in her beautiful half million dollar honey house than it was out of her garage. She says part of her success is in not playing the price game. Her motto is to do it better, not cheaper.

Beth conducts the CSBA Traveling Road Show for Four Corners Beekeepers.

Of course, the bottom line for Beth is the bees. When asked why she still keeps bees even though she sells so much more honey than her own colonies can produce, she says the honey sales are just to cover her beekeeping habit. Beth was one of those kids who love bugs. She lived in Maryland for a while as a child, and collected bugs for her 4-H project. She won the state fairs in both Maryland and New Mexico with her collection, part of which still hangs in her house as art. As an adult, she was intrigued by the beekeeping tales of Tom Theobald, who wrote a newspaper column here in Colorado, and decided to take a beginning beekeeping class. She started with two colonies which, as she learned more and became a successful beekeeper, grew to 20-25 colonies. She had read that it was difficult to get past that number of hives, but decided to jump in with both feet. She now runs around 100 colonies on her own, all while keeping that amazing honey business running.

"Better, not cheaper" guides her beekeeping decisions as well as marketing. She takes the time to run wax and wire foundation, and spent a lot of time last Winter putting frames together, to be ready to cycle out old comb. She says her key to good beekeeping is in not scrimping, either with time or materials. She approaches it with analytical thinking as both care for a bee – and care of a colony. Beth feels that in order to solve our bees' difficulties, we need to use a holistic approach. Rather than focusing on just mites, or just pesticides, we need to look at the whole picture. For instance, rather than feeding pollen substitute, we need to be planting better and varied forage. She sees opportunities everywhere, from roadsides to airports. In fact, a big part of her success in bee clubs, in business, and in beekeeping probably arises from the fact that she has a gift for seeing opportunities in many different situations and being willing and ready to invest what it takes to make that opportunity an achievement. The world of bees, beekeepers, and pollinators is so much better for having Beth Conrey as its champion. BC

One of Beth's apiaries in Northern Colorado. Note how tidy – Beth never throws burr comb or anything on the ground near her beehives.

Meet Julia Mahood

Nascent Honey Bee Drone Lover

Malcolm **Sanford**

Consider a mother of two young boys, afraid of "bugs" for most of her life, who becomes a honey bee drone lover. Taking a beekeeping course on a whim in 2007, Julia Mahood fits this uncommon profile. And if that isn't enough she's a graphic artist who appears to be on track to also become a published scientist and an able pilot of another kind of drone, an Unmanned Aerial Vehicle (UAV). Julia concludes, "something about these often disparaged boy bees sparked an interested that has only grown over the years."

Her entrance into drone study was, to say the least, problematic. After hearing a discussion at the 2011 Young Harris Beekeeping Institute on something called "drone congregation areas" (DCAs) and their relationship to helium balloons, she found herself in the grocery store purchasing a Mylar® birthday balloon, and baiting it with artificial queen lure. Walking around her neighborhood in hopes of attracting drones, "like a crazy lady," netted nothing more than some askance looks.

Drone congregation areas are specific geographic spaces conducive to gathering male honey bees. When flying queens approach, drones chase them in "comets" and mate with them in the air. Research on DCAs has always been challenging because flying honey bee males following a lure are hard to track. Pioneering studies using balloons and/or radar have generally been used.

After procuring an actual weather balloon and enlisting a helper, Julia spent some time walking over "obvious spots" in her neighborhood (open fields with a wind break) – a soccer field, parking lot, and a particular back yard lined by trees. Unfortunately, she didn't attract a single bee with her balloon. Sadly, she reports her helium balloon was dead on the ground the next day, forcing her to conclude there had to be another way.

Fortunately, she found a substitute technology, the UAV, which is becoming ubiquitous, but can be daunting and expensive. Her neighbor, David Kraft, was a professional pilot and by coincidence was a beginning beekeeper and so a partnership was born. She mentored him in bee culture while he taught her to pilot a UAV. She reported that it was David's suggestion to use thin thread to hang the mating lure from, so that if it gets caught on something you just lose a few bucks worth of lure and don't crash your UAV. Julia concludes: "To be honest I was terrified to fly the thing. If it gets out of your sight and goes down not only are you out some expensive equipment, but what if it crashed into a car? It's hardly a toy! So I ventured out with baby steps. At first David piloted the drone and before long I had the hang of it and have been flying 'solo' ever since."

Meanwhile Julia has continued her training working toward becoming one of Georgia's Master Craftsman beekeepers. According to Dr. Keith Delaplane, this is the highest grade in the University of Georgia's beekeeper training program. He concludes, "she has quickly outpaced me or any of her other science advisors, and I can vouch for Julia's persistence and understated expertise on the matter of drone congregation areas. As a layperson, she has tutored herself exhaustively on the original scientific literature and done the hard work of trial-by-error to figure out how to monitor drones with UAVs. It's exciting to see someone like Julia recognize a knowledge gap, and boldly insert herself into the process of discovery. I think her results will ultimately be publishable in the scientific literature and make a real contribution to our understanding of honey bee mating and, by extension, colony genetics and ecologic robustness against pests, parasites, and habitat disturbances." Jennifer Berry, also at the University of GA Honey Bee Laboratory, has helped Julia in her studies and agrees with this assessment.

Julia concludes from her studies so far that looking for a DCA can feel like looking for a needle in a haystack. "I remember telling Dr. Delaplane that I just didn't think it would work but he encouraged me to keep at it. The first DCA I found was actually just one lot away from the soccer field that should have been the textbook DCA! One day, after yet another unsuccessful flight over the soccer field, I noticed that this lot next to the field was just over a small hill (depression in the landscape – one of the cues) and thought it was worth flying over. Eureka! Watching the drones zipping around the lure was like magic and I was absolutely over the moon and eager for more!

"It took many weeks of flying to find the first one, after that I think I found three in a week! One surprising thing I discovered is that drones in my part of the world fly later, starting at 3 or 4 pm and are still flying sometimes at 6:30 or 7 pm in Summer months. The books say 1-4 pm but I have yet to see them flying in a DCA at 1 pm, even though I've seen drones leaving the hive at noon. One of the fascinating things about the DCAs that I've found is that often I see the drones flying over trees, not in 'open areas surrounded by wind breaks' as the books say. I think the fact that you are limited when using a pole or weather balloon might have limited folks to thinking that DCAs are primarily in open areas when that might not be true."

Another Jennifer (Leavey) at GA Tech has provided Julia with resources, including research papers, encouragement and ideas with respect to Julia's website. Dr. Leavey is a Principal Academic Professional in the School of Biology and the College of Sciences. She is the Director of the GA Tech Urban Honey Bee Project, an interdisciplinary educational initiative with the goal of recruiting and retaining students in STEM careers through the study of how urban habitats affect honey bee health and how technology can be used to study bees **https://biosciences.gatech.edu/people/jennifer-leavey.**

Dr. Leavey is also working with Julia on a project tagging drones with RFID (radio-frequency identification) chips to monitor when they come and go, giving comprehensive data on how long drones live, when they start flying and how long they are gone. Dr. Leavey has been incredibly helpful in other ways as well: "When I mentioned how there's not much new data on how long drones live and when they fly and she immediately said 'We can study that!' Now we've got the equipment and hopefully it'll happen next Spring."

Since there's not a lot of data on DCAs, Julia took another step to find out more about them by creating a Citizen Science project website entitled Map My DCA **http://mapmydca.com/about-us/**. "Reading about other Citizen Science initiatives made me think that perhaps collecting this data might be worth something. I was a little intimidated, but I got a grant from the Georgia Beekeepers Association to pay for the initial website coding. I'm a graphic artist so I designed the logo and set up the look of the graphics, and wrote the copy. Making the map was the tricky part. It took a fair amount of back and forth with the coder to get it right, and I'm still tweaking it. I have made changes whenever users give me feedback, and am soliciting more from visitors to the site." She featured her website and research activities in the recent Fourth International Hive and Bee Monitoring Conference, a virtual event produced by Dr. Jerry Bromenshenk and colleagues at the University of Montana.

With reference to the Citizen Science project, she reports "owning a fairly nice UAV but I don't want purchasing an expensive piece of equipment to be something that keeps folks from participating. I ordered a $50 UAV from Amazon to see if one that inexpensive would work. It came with the most awful instructions, and was not calibrated to the controller. So up it went but when I used the controls to bring it down it just kept going, hitched a ride on some wind, and left my line of sight! I found it two doors down, buzzing in my neighbor's shrubbery. I was so glad it didn't cause a car wreck! Some googling showed me that it has to be calibrated first (but no instructions how to do so are available). I also realized that you have to have a UAV with a controller (can be a smart phone) with a screen so you can view footage as it's flying. This one had a camera but you have to land it and take the SD card out to watch the footage. That really won't work, you need to see what is happening in real time. I am continuing to investigate inexpensive UAVs to be able to suggest reasonable resources when asked.

"The main goal I have at the moment is to get the word out about this project and encourage folks to find DCAs and pin them on the site's map. I have been speaking at bee clubs every chance I get, and lots of people have registered on the site, but only a handful have pinned locations. I think it's a big leap from wanting to hunt for DCAs to making the time to do it, and sticking with it when it can take awhile to find them."

For more information on this topic, listen to the January 22, 2019 podcast by Mandy Shaw **https://www.beekeeperconfidential.com/podcast/episode/3a3b4246b/julia-mahood-or-map-my-dc**, and access the presentation at the Montana monitoring workshop noted above, entitled "Game of Drones." **https://www.youtube.com/watch?v=z7iMW6ERzWU&list=PLK1L4YyuyoO1WxuH1Dg4sxhM-FOEDYhW_&index=37**

Beyond her activities with DCAs another of Julia's passions is education. In her case, it's teaching beekeeping in prison. This is her fifth year at Lee Arrendale State prison, the largest women's facility in Georgia, housing around 1,700 inmates at all security levels. She began with a class including inmates with a range of sentences – some who would be getting out shortly and be able to possibly carry beekeeping into their new lives, and others with life sentences that would be around "for a minute" as they say, and become mentors for new classes.

That first year started with six hives on the prison grounds and in the last four years 31 women have passed the Certified test, and six the Journeyman level, which includes the only two Master Beekeepers in Georgia to complete this level while incarcerated! She has two volunteers, Virginia Webb and David Hollomon. Jennifer Berry and Jack Garrison at the University of Georgia travel the state administering the tests at this prison as well as others in the Association's prison education program.

In addition to teaching at Arrendale, Julia is the prison program committee chair for the Georgia Beekeepers Association, recruiting volunteer instructors for other prisons in the state and helping new programs get underway. She says teaching in the prison has been the most rewarding work she's ever done, besides being a parent. These women are so incredibly grateful for the opportunity to work in nature, to learn, to educate others about honey bees, and to have some meaningful work and study to enrich their lives. "I've seen that when folks don't have a lot to work with, they become incredibly creative. One of my beekeepers we call 'MacGyver' because she can find a way to use the limited materials allowed in prison to do amazing things."

An article on the prison program in *Atlanta Magazine* (July 2018) reports, "As part of Mahood's class, the Arrendale beekeepers have learned everything from the scientific nomenclature of honey bees to the various pests that can threaten the hives – all without access to the internet. They've formed a honey bee club, which publishes a monthly newsletter called the *Nectar Collector* on a 20-year-old monstrosity of a desktop computer. And

in 2016, the honey they collected from their hives placed second in a special category of the Georgia Beekeepers Association honey contest."

Besides providing women prisoners with a possible employment opportunity on release, the article concludes: "Tending the bees also provides the women with an opportunity to go outside, collaborate with each other, and learn something new. It's an antidote, Mahood says, to the monotony of day-to-day life behind bars.

"'They all love the beekeeping,' she says. 'And most of the time, I feel like I'm just with some people teaching a beekeeping class – once you get blind to the razor wire and stuff.' Teaching the inmates and seeing their progress has also been a transformative experience for Mahood. 'When they're in my class, she says, 'they aren't criminals. They're beekeepers.'

"'As the class works together to light the smoker and cluster the humming, buzzing bees, their knowledge and dedication become apparent. 'Bees insulate their hives with propolis,' says one inmate, pointing to the comb's waxy walls. 'It's also a powerful antiviral.' 'They're clustering in the center of the hives to keep warm,' says another.

"The women are as comfortable with the insects as most people are with kittens and puppies and just as nurturing. They sense what mood the bees are in – whether they're angry, scared, or happy. A third inmate, a member of that first class, notes that bees work together as a community, in perfect harmony, for the good of the queen and the colony. They don't have ego, she says. Every bee has a job, every bee matters. The metaphor isn't lost on Mahood."

Julia has harvested a lot of stories emanating from her experiences in the prison. One is particularly heartfelt: "An inmate got more than knowledge from her beekeeping program. In 2007 she pled guilty to murdering her ex-husband, believing she was protecting her young daughter. She hadn't seen the then six-year-old daughter since. While working on requirements for the Georgia Master Beekeeper designation, the Journeyman students wrote about their prison beekeeping in an article in *Bee Culture* magazine. As fate would have it, the then teen age daughter, herself a new beekeeper, surprised her mother with a visit after reading the article. Since then they have been enjoying a new relationship, sharing their love of bees." Julia looks forward to seeing more examples of how beekeeping can enrich and transform lives in numerous ways, especially for the incarcerated.

For a fuller description of the prison experience, consult the podcast by Mandy Shaw on March 30, 2019: **https://www.beekeeperconfidential.com/podcast/episode/35dc22bc/julia-mahood-or-beekeeping-at-arrendale-state-prison**. Meanwhile look for more reports from the field including postings to the Map My DCA website **http://mapmydca.com/**. There's little doubt that Julia will continue her quest to ferret out the details of just one of the numerous fascinating aspects of honey bee behavior she calls "the dance of the drones." BC

Haroon Rasheed

California Beekeeper From Pakistan

Ettamarie **Peterson**

Thirty-two years ago, Haroon Rasheed arrived in the United States as a student. He did not come to be a beekeeper. As a matter of fact, he had a fear of bees since being badly stung by some very unhappy *Apis dorsata* bees after they were disturbed by his brother and friends when he was 10 years old. Those bees make giant combs hanging from tree limbs and are much larger than our *Apis mellifera*. They are one of the three native species that are found in Pakistan. The *Apis mellifera* specie that Haroon now lovingly keeps is considered an exotic one in Pakistan. There are now about 7,000 beekeepers with those honey bees in Pakistan.

Haroon told me the Quran tells us about honey bees. The Bees is the 16th chapter (sūrah) of the Qur'an. It is named after honey bees mentioned in verse 68, and contains a comparison of the industry and adaptability of honey bees to the industry of man. It is interesting to know that 1400 years ago the Quran refers to bees that generate the honey as females (the Arabic grammar is in the female mode): [Quran 16.68-69] This is what I learned looking it up: "And your Lord (Allah) revealed to the bees: Build your hives in mountains, trees and in what they build. Then, eat of all fruits, and follow the ways of your Lord made easy (for you). From their bellies comes a drink of various colors, in which is health for mankind; indeed, in this is a sign for people who ponder." Muslims, Christians and Jews worship the same God. The Bible has four mentions of bees and multiple references to honey. (My personal favorite is John, the Baptist, eating honey with locust! Not my idea of a good meal but to each his own.)

Haroon shares his honey with all the City of Vallejo's helpers. This is one of the many garbage collectors that got a jar.

Haroon keeps close ties to people in Pakistan and has become interested in promoting urban gardening projects there. He is an extremely civic minded person, caring about citizens of his native country and the country he became a citizen of in 2001, the United States of America, particularly his town of Vallejo, California. He has set goals for himself and his beekeeping enterprise. One goal is to encourage more people in Vallejo to become beekeepers. He would like to start a beekeepers' organization soon. The purpose of the organization would be for beekeepers to help each other. With Haroon's fantastic charisma and his wife, Chris, Rasheed's great organizational skills will make this happen shortly after the Covid 19 virus is under control and people can get together. He has already found two possible venues for meeting rooms.

Nine years ago, a swarm landed in his garden. The beekeeper that came to get the swarm became Haroon's first mentor. He was helpful the first year. After the first year Haroon was looking for more information and different beekeeping techniques that he felt more comfortable with. In 2016 he started coming to the Sonoma County Beekeepers' Association meetings after hearing a talk by Christine Kurtz, an active member.

In January of 2017 he organized an event to introduce beekeeping to people in Vallejo. He had Christine Kurtz come to speak about natural local beekeeping and how to save the bees. At this event they let the people taste 20 different local honeys. He has learned a lot from her and another member Serge Labesque. He has attended lectures and workshops given by Serge Labesque and follows his advice. Labesque is a treatment-free beekeeper and has modified the Langstroth hive a bit to make it closer to how the bees would organize it in nature. For example, Haroon's hives all have follower boards and monitoring boards below the screened bottom boards to determine the health of the colonies.

When I asked Haroon if there was anything special he does with his bees, he laughed and said his wife Chris tells him he should talk more to his bees. One thing he is very careful about is leaving enough honey, so he never has to feed the bees. He considers himself an urban farmer. On his property he has 32 fruit trees with 15 varieties of fruit. Vallejo has an ideal climate for growing various fruits, vegetables and flowers to provide nectar and pollen for his bees. It is on the San Pablo Bay and does not get frost. This year because of the Covid-19 crisis he started his first vegetable garden to supplement his family's and neighbors' food supply. He is encouraging his friends and neighbors to grow more bee friendly plants as well as become beekeepers if they can. In his neighborhood there are now seven apiaries, several small chicken flocks, with many more vegetable gardens and small fruit orchards.

Haroon and Chris have made their neighborhood almost like a

Haroon's honey.

family. They have various celebrations with them including Halloween, Christmas and Eid (Muslim Holiday) and any other excuses to get together. (This year Chris is already thinking and planning how she can do this with the Covid-19 virus restrictions.)

They have had the neighbors' children paint their beehives. On one hive in his home apiary they painted Salaam in Arabic, Shalom in Hebrew and peace in English and Japanese. Basically, all of those words and different languages mean peace. Sharing honey does promote peace. The honey gathered is shared with all the neighbors not just next door but two blocks in all directions. Their enthusiasm for beekeeping and gardening has spread up and down the nearby streets. The newspaper said they have turned their "C" Street into Bee Street!

In his home country, Mr. Imran Khan, the Prime Minister of Pakistan made a large step initiating the 10 Billion Tree Tsunami in 2018 to counteract the ravages of climate change in Pakistan. Just recently a record of 2.4 million trees were planted in one weekend! It is one of the countries most affected by increasing heat, floods and drought. Haroon would like to see this sort of program happen here in his adopted country.

His wife reminds him that many such social programs were put in place during the depression, not only for employing the unemployed but creating infrastructure benefiting the entire country. He knows it is helping the out-of-job workers in this pandemic in Pakistan planting thousands of tiny seedlings enabling them to feed their families and help support the economy. It can also help feed the bees.

Haroon and Chris have named their honey business Bee Happy Raw Honey. The unique thing about his business is that he does not sell his honey. He gives it all away! Last year he gave away fifty pounds. He gives it to Congressmen, nurses, doctors, mail carriers and sanitary workers as well as friends and neighbors. He has set a goal this year to give away one hundred pounds of honey. While I was visiting him, he actually passed this goal by giving some of his one-pound jars to the newspaper photographer that was there taking pictures of his gardens. Before I left, he gave me jar number 102 and has many more ready to give away. Their honey label reflects their passion for what they do. It says, "Bee Happy Raw Honey 'Save the Bees' Support Urban Bee Keeping. They can be found at Bee Happy Raw Honey on Facebook or contacted at **beehappyrh@gmail**.

Haroon and his wife Chris in the apiary in his front garden.

When he was in the clothing manufacturing business, he had a line of shirts and "hoodies" designed that say, "What's Plan Bee?" and has a large drawing of a bee. When he closed the clothing business, he donated unsold clothing instead of selling it. He is a person who literally would "give you the shirt off his back"!

Another goal Haroon has set is to make his town of Vallejo have the most urban beekeepers in California. This involves a lot of outreach and education, but he has the enthusiasm and drive to do it.

He is also promoting the use of gray water to grow gardens without wasting precious water. California has had many drought years. Haroon is aware that using recycled water and growing more plants and trees without pesticides and herbicides will make a big improvement in the environment and thereby help the bees and other living things be healthier. He is sharing his knowledge of this type of gardening with his neighbors and the people in the city of Vallejo.

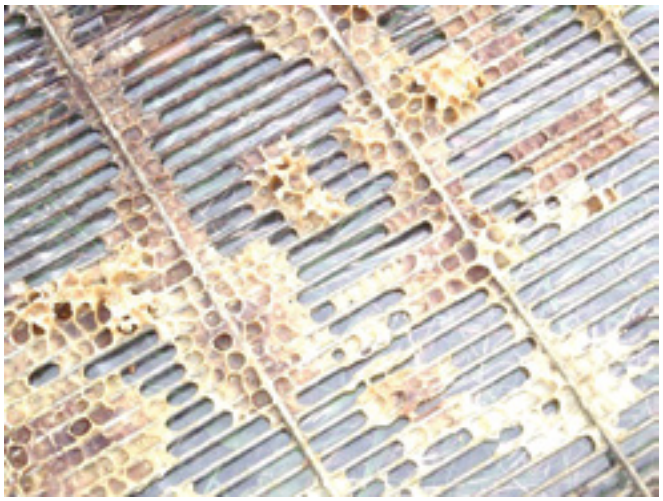
In mid-August of 2020 the local newspaper published another article about Haroon and Chris' gardens and beehives with photos of the couple with them. In the article he told the reporter, "As our community faces uncertain times, we actually find ourselves presented with a unique opportunity to create a healthier planet and healthier population. Taking small steps now will affect future generations to come promoting urban farming as a way to adapt to climate change that includes rising temperatures and drought.

Haroon is busy now checking out venues for a future beekeeping organization. He is highly motivated and knows how to spread the word by using the local press and his neighborhood outreach.

His commercial beekeeper friend, Sir Richard Evans from Gold Rush Honey Company has been a big help. This man also believes in the same natural beekeeping methods as Haroon.

Haroon increases his own stock of bees by collecting swarms and making splits. This is how he is helping the neighbors along with being a mentor to them. In the future more people of Vallejo will be benefitting by this model of sharing bees and knowledge. BC

Haroon's front garden apiary with the hive that has "peace" in several languages.



CLEANING QUEEN EXCLUDERS

Cruddy Is The Word

Ed **Simon**

Your supers have been pulled. Your honey has been extracted. Your supers are stored for the season and now you are in the final stages of cleaning up the area you keep all your bee equipment. Then you look over in the corner and see a stack of forgotten queen excluders that should be straightened. While restacking them you realize they are unbelievable cruddy. **CRUDDY** is without a doubt an understatement for the condition of most of your excluders. You have been meaning to clean them for the past two years. Something needs to be done to make them usable for the coming season.

Cleaning queen excluders is a task very few beekeepers relish or look forward to. When the queen excluders get so clogged up with comb that it looks as if there is no way the workers can get through it, it is time to perform a thorough cleaning.

Removing the old comb and propolis is not an easy task.

BUT it's not as hard as you think it is when you add one additional item to your toolbox. You can use it to ease the labor involved in cleaning the accumulated CRUD. This tool is a heat-gun. Luckily only a few additional items are needed to clean your queen excluders. They are a piece of metal to protect your workbench and your ever-present hive tool.

Note: I use a heat-gun with six setting up to 1800°F. and a low or high-speed fan.

Procedure

The following steps allow you to clean your queen excluders with a minimum effort. Although they will never be returned to a new condition, they will be usable and because of the removal of built up propolis on the rims they will sit evenly on a hive.

Step 1: Scrape off wax and propolis.

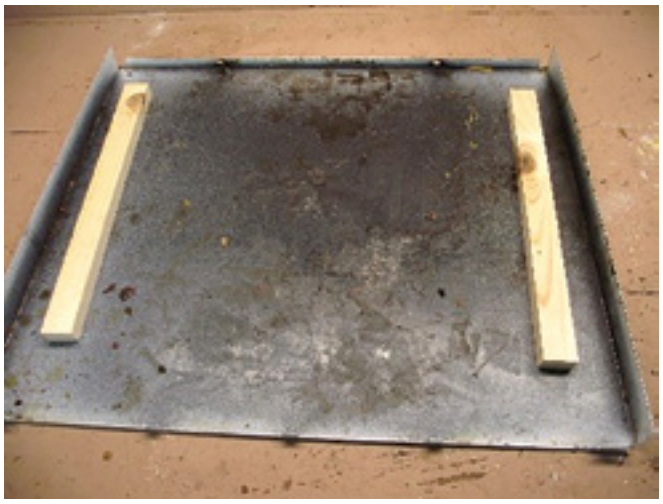
Remove a much wax and propolis as you can with your hive tool. This isn't any different than the normal cleaning you would do. Do not spend any extra time trying to clean between the wires. Just remove the clumps.

Note: When scraping the excluders save the wax. You can process this wax during your normal wax processing.

Step 2: Prepare your work area.

A little preparation can make the final work area cleanup a breeze. Place a piece of metal on your workbench to catch the melted wax and propolis. Then add a couple pieces of wood that will be used to raise the excluders off the metal. It helps if the metal "tray" has raised edges to contain the melted wax.

Note: The front panel of a trashed dishwasher is used as a universal protector for my workbench. It has enough of an upturned lip to contain minor liquid spills.



Step 3: Stack two or three excluders on the wood.

By stacking and processing more than one excluder at a time you save time, electricity, and labor.

Step 4: Melt the wax.

Use the heat-gun to melt the wax and propolis. Aim the gun directly down on the wax. If you stacked the excluders the heat not used to melt the wax on the top excluder will melt the wax on the underlaying excluder(s). Eventually the wax will drop onto the tray. If the wax refuses to drop from the excluder, lift it by an edge and let it drop. This usually jolts the wax from the wires.

Note: Use the hotest temperature available on your heat-gun. If the gun has a separate air flow regulator, use the highest setting. This helps force the melted wax off the metal grid.

Step 5: Clean the edges.

Use the heat-gun to warm the edges or rim of the excluder. Once the wax or propolis is warm it can be easily removed by scraping.

Step 6: Recycle the wax.

When you are finished cleaning the excluders, you need to clean the tray. This is the easiest part to perform of the whole operation. Warm the wax and propolis mixture on the tray. Then use your hive tool to scrape it clean. Save the wax and propolis mixture for later processing.

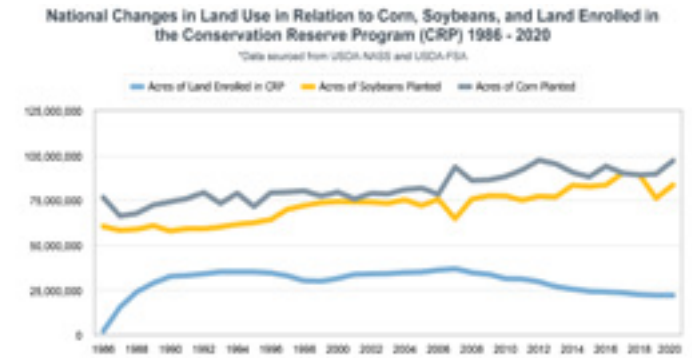
It is time consuming to clean your queen excluders, but it is not physically challenging or even hard work. Your clean propolis free excluders will sit better when used and the wax free slots will permit easier access of workers to the honey supers. BC

PAm Makes it Possible *On the Landscape*

If you were a fly on the wall of any beekeeping conversation – a local club meeting, a national conference, or a chat between two commercial beekeepers – it is likely that you would hear some talk about forage. Beekeepers' success depends on understanding what's blooming. From urban rooftops, to farmlands in major honey producing states, to crops being pollinated, whether the bees are moved or stationary, the food and resources that honey bees have access to are major factors influencing their health and vitality.

Access to forage is a hot topic on a policy level too. National Forests have recently become central to the conversation surrounding the use of public lands as bee pasture for commercial beekeepers. The fulcrum of this conversation is understanding interactions of honey bees and native bees when they are sharing resources. There are many things we don't know about these interactions, and PAm is supporting research to learn more. What we do know unequivocally, is that forage for all pollinators is being lost on a large scale.

USDA-NASS data clearly shows the expansion of croplands, converting wild spaces and grasslands to monoculture crops, often heavily treated with pesticides, leaving ever less on the landscape to support pollinators.



Visit **www.beehealthcollective.org** *to access credible, data-driven information about honey bee health including habitat and land use changes.*

Although honey bees are blamed for competing for resources, the number of honey bee colonies in the US is actually about 500,000 less than in the late 1980s. The root problem hurting all bees is that pollinator forage resources are shrinking. Investing in a landscape that supports more pollinators will benefit native pollinators and the honey bees we rely on for our food and agricultural systems to function.

There is no substitute for natural forage, and as crop pollination demands keep rising, honey production per colony is falling, more pests and pathogens are discovered, and clean abundant forage is decreasing, it can sometimes it feels like beekeepers have few options left.

As a nonprofit organization dedicated to enhancing honey bee health and crop production, supporting practical research is our 'long game,' and we have funded over 120 projects. While the science progresses to unlock bee health solutions, providing more healthy forage can save struggling bees today. With our sister organization, the Bee & Butterfly Habitat Fund, we are leading efforts to restore habitat and provide important forage for honey bees and other pollinators.

"Beekeepers have been keeping bees for 100 years where they have focused entirely on finding habitat. But we've already found all of the habitat, and it's depleted. So, now we have to create it, we have to invest in it"
– Zac Browning, Browning's Honey

Using creative and innovative methods and working with agriculture, we are investing in habitat for our working bees, in almond orchards and in the Upper Midwest. In 2011, Seeds for Bees® was founded to enhance forage in almond orchards before and after almond bloom, and has planted over 40,000 acres of blooming cover crops and wildflowers in California, boosting the health of bees pollinating almonds and beyond. Preliminary research by UC Davis is showing significant benefits of this forage to honey bee colony strength.

The Bee and Butterfly Habitat Fund makes free seed available to landowners and growers in the upper Midwest and Great Plains to plant pollinator habitat. This habitat is established with one-on-one technical guidance and specialized, regional seed mixes that are designed to support honey bees and monarch butterflies, are cost-effective, and provide superior weed competition. Focused on major summer forage sites and honey producing states, BBHF NextGen® seed mixes have been shown to provide 8x the pollinator value of other pollinator habitat programs.

PAm is committed to doing everything we can to help beekeepers and honey bees thrive, and forage is the bedrock of bee health. If you pollinate almonds, have land in California, or have bees in the upper Midwest, you can help by talking to the growers you rent bees to, applying for free seed, or connecting the landowners you work with to our programs. Reach out to PAm! - Use our materials to start these conversations, or let us help you plant your own habitat!

To Learn More about Seeds for Bees, The Bee & Butterfly Habitat Fund, and apply to enroll today, please visit:
ProjectApism.org/forage

For More Information about PAm funded forage and nutrition research, please visit:
ProjectApism.org/honey-bee-research

A Beekeeper's Night Before Christmas

Tis the day before Christmas (or is it the 'eve'?
What's politc'ly correct? Don't know what to believe.)
Tis the EVE before Christmas and all through the yard
The bees are at rest after working so hard.
The workers are clustered, the queen in their midst;
The drones are departed (I bet they were p….d.)
The honey is stored, egg-laying's on hold;
Tis only the 'keeper whose out in the cold
Well, she and some mice, who are very frustrated
Though feelings of mice are much overrated.

Through the Winter we sit, our hearts in our mouths,
Are the bees still OK or will they go south?
Do they have enough food? Will they survive?
Can they keep all that snow from colding the hive?
Oh what I would give for a quick cleansing flight
Just to have a few ladies back in my sight
And know they are safely back in their home
With their bowels all clean … but enough of this tome.

It's OK to worry, it's OK to moan
When your hands are frigid and you're chilled to the bone.
It's time for some dreams of two twenty one
Of covid-19 all over and done;
Of beekeeper meets, of friendship, and plenty
Of girls in the hives, of warmth of the sun,
Of hive tools and smokers and oodles of fun…

Enough of this pretentious and pompous mailing,
Sent with warm wishes and none of the wailing;
But a tip of the veil to all in the country –
Beekeeping friends who share in the bounty
Of fellowship, caring and mutual affection
For the bees in our lives, our shared attraction.

Before I conclude this festive-time letter
Let me remind you NEXT YEAR WILL BE BETTER!
A wing and a prayer and plenty of trust –
That's all that is left so finally I must
Get under the blankets and turn out the light –
MERRY CHRISTMAS TO ALL AND TO EACH A GOOD NIGHT.

Apis m shakesbeere

HONEY BEE MICROBIOME

It's The Key To Bee Recognition

Talia **Ogliore**

For a honey bee, few things are more important than recognizing your nestmates. Being able to tell a nestmate from an invader could mean the difference between a honey-stocked hive and a long, lean Winter.

New research from Washington University in St. Louis shows that honey bees rely on chemical cues related to their shared gut microbial communities, instead of genetic relatedness, to identify members of their colony.

"Most people only pay attention to the genetics of the actual bee," said **Yehuda Ben-Shahar**, professor of biology in Arts & Sciences and corresponding author of the study published Oct. 14 in **Science Advances**. "What we show is that it is genetic, but it's the genetics of the bacteria."

Honey bees recognize and respond to chemical signals from other bees that they detect from skin compounds known as cuticular hydrocarbons, or CHCs. This study determined that a bee's particular CHC profile is dependent on its microbiome – the bacteria that make up its gut microbial community – and is not something innate or genetic to the bee alone.

"Different colonies do in fact have colony-specific microbiomes, which has never been shown before," said Cassondra L. Vernier, postdoctoral associate at the University of Illinois, who earned her biology PhD working with Ben-Shahar at Washington University.

"Bees are constantly sharing food with one another – and exchanging this microbiome just within their colony," said Vernier, first author of the new study.

Co-authors include **Gautam Dantas**, professor of pathology and immunology and of molecular microbiology at Washington University School of Medicine in St. Louis, and Joel Levine at the University of Toronto Mississauga. The work was conducted in part with bees housed at **Tyson Research Center**, the environmental field station for Washington University.

"The importance of this paper is that it's one of the first papers that actually shows that the microbiome is involved in the basic social biology of honey bees – and not just affecting their health," Vernier said. "The microbiome is involved in how the colony as a whole functions, and how they are able to maintain nest defenses, rather than just immune defense within an individual."

Microbiome influences communication

The gut microbial community – or microbiome – supplies humans and other animals with vitamins, helps digest food, regulates inflammation and keeps disease-causing microbes in check. Increasingly a topic of research interest, scientists have discovered many ways that the microbiome blurs the borders between a host and its bacteria.

The microbiome has been found to influence communication in several different organisms – including, notably, large animals like hyenas.

For honey bees, this study shows that the microbiome plays a critical role in defining the tightly regulated chemical signals for group membership.

Until recently, most scientists thought that honey bees identified nestmates by picking up on a homogenized scent that they recognize from members of their own colony – "a kind of hive B.O.," Ben-Shahar joked.

Bee colonies are usually composed of highly related individuals. But the chemical signals that allow bees to recognize each other are not determined by genetics alone. Researchers know this because baby bees can be placed into other colonies without being rejected – up until a certain age and level of development.

"It has to be something that they acquire during their lifetime that defines their nestmate recognition cues," Vernier said.

Acquired from interactions with other bees

In previous work, Vernier and Ben-Shahar showed that bees develop different scent profiles as they age, and that gatekeeper bees respond differently to foragers returning to the hive compared with younger bees that have never ventured outside.

Earning a bee's wings

That research established a relationship between nestmate recognition and the clearly defined, age-dependent division of labor typical to honey bee hives.

Only when a bee is old enough to interact with others outside of the hive does it become recognizable to others. That was a clue for the researchers.

"If you grow a honey bee in isolation, it will never develop a complete microbiome," Vernier said. "It actually has to acquire most of it from interactions with other bees."

For this study, researchers determined that forager bees from different honey bee colonies have different gut microbial communities and CHC profiles by sequencing gut samples and analyzing cuticular extracts. The scientists also conducted cross-hive fostering experiments, raising groups of newly hatched bees in either their own colonies or unrelated colonies.

Are you who you say you are? Guard bees inspect a forager at the entrance to a hive. Research from Washington University in St. Louis suggests that the gut microbiome is critical to communictions for honey bees. (Photo Nathan Beach)

In the fostering experiments, the researchers found that both source- and host-colony related factors contribute to variations in the overall gut microbial community of individual bees. Of the 14 microbial taxa that significantly differed between treatments, six were similar between bees that shared the same hive environment while they grew up – regardless of actual genetic relatedness.

The researchers also found that they could manipulate the microbiome of sister bees by feeding different microbes to newly hatched bees. In addition to developing different gut microbial communities, the bees also grew to have different CHC profiles.

"They were unrecognizable to their siblings," Vernier said. "Manipulating the microbiome was enough to cause sister bees to develop different scent profiles."

The right stuff

This new work is significant in part because it shows an integral role for the microbiome in the essential, everyday social interactions of honey bees, the Earth's most important pollinators, researchers said.

"For bees, some of the most complex aspects of their social behavior basically depends on bacteria – more than anything else!" Ben-Shahar said.

"It doesn't matter how related they are," he said. "Their ability to say 'you belong to this group' basically depends on getting the right bacteria at the right time. Otherwise, they are blind to it."

Honey bee foragers returning to the hive. (Photo Nathan Beach)

And bee ID is key.

The biggest enemy to honey bees is other bees.

"During Fall, when plants stop producing nectar, there is a period of time when robbing is very prevalent in colonies," Vernier said. "Robbing bees will find other colonies, and if they're able to get in and take some honey, they will go back to their own nests and signal, 'Hey, go over there. There's a nest that's not good at guarding, and we can steal their honey.'

"Robber bees will take that honey and leave the other colony to starve," she said. "It's a very strong pressure."

Robbing deprives both the host bees and their associated bacteria with important resources – which may have been the original drive to form this special bacteria-animal partnership, the researchers said. BC

Fun December Recipes

Shana **Archibald**

Almond Brittle
1/2 cup butter (1 stick), softened
1/2 cup sugar
1 tablespoon honey
1 cup sliced almonds

Line an 8″ x 8″ pan with aluminum foil, leaving foil extended by 2″ on two sides for easy removal. Coat the foil with butter. Set aside.

Coat the sides of a medium saucepan with butter.

Add butter, sugar and honey to saucepan and heat over medium-high heat, stirring constantly.

Continue cooking and stirring until mixture is golden brown.

Add sliced almonds and pour into buttered pan. Place in the refrigerator and chill until firm.

Invert pan, take crunch off aluminum foil and break into bite-sized pieces.

Store in an air-tight container for up to one week!

Honey Roasted Carrots
2 tbsp unsalted butter
2 tbsp honey
1 pound carrots

Preheat oven to 425°F. Grease a baking sheet with non-stick cooking spray, set aside.

Cut carrots on a bias making sure to keep them similar in size. Place them in a single layer on the prepared baking sheet.

Add butter to a medium saucepan and cook over medium heat until light brown/caramel in color. This takes about five to 10 minutes. Make sure to keep and eye on it so butter does not burn. It also helps to use a light colored saucepan for this.

Add the honey to the browned butter and stir to combine.

Pour the honey butter onto the carrots and toss until the carrots are evenly covered with the honey butter.

Bake for 20 minutes or until golden brown and tender. If you want extra caramelization broil on high for one or two minutes. Just make sure to keep a close eye on them so they don't burn. Serve immediately and enjoy!

Correcton – In our November issue we inadvertenly left off one line on the Honey Baked Ham recipe. We apologize for the confusion this may have caused and below is the entire recipe.

Honey Baked Ham
8 lb bone-in spiral sliced half ham
2 Tbsp butter, melted
3 Tbsp honey
1½ cups granulated sugar
½ tsp seasoned salt
½ tsp onion powder
½ tsp ground cinnamon
½ tsp ground nutmeg
¼ tsp ground ginger
¼ tsp ground cloves
¼ tsp paprika
pinch of allspice

Trim ham if needed, then place in slow cooker. Combine melted butter and honey, then massage over ham, getting in between the slices a little. Cover and cook on LOW 4-5 hours.

At the end of the cooking time, preheat broiler to HIGH, and line a roasting pan with heavy duty aluminum foil.

Combine sugar, seasoned salt, onion powder, ground cinnamon, ground nutmeg, ground ginger, ground cloves, paprika and allspice in a small bowl. Pat half of the sugar mixture over the top of the ham.

Broil for several minutes, until bubbly and caramelized, then remove from oven to a small saucepan, adding in remaining sugar mixture.

Add 3 Tbsp of either water or ham juices from bottom of the slow cooker. A combination of water/ham juice and bourbon is a nice alternative! Stir, and heat to a boil. Boil for about a minute, then remove from heat.

Brush or pour glaze over the ham, then broil again for a minute or two (careful not to let it burn!). Remove from oven and let ham rest for 5-10 minutes
Serve warm or cold and enjoy!

Wayne A Stoller

Wayne August Stoller, aged 94 of Latty, Ohio, died Monday November 2 in Sylvania, Ohio where he was residing temporarily after a brief illness. Prior, he had been a resident of the Country Inn of Latty since 2014.

He was born October 2, 1926 to Irvin and Marie (Laukhuf) Stoller of Latty, Ohio. On December 29, 1946 he married Dorothy Furrer of Wolcott, Indiana. To this union were born three sons: Wendell, Lonnie and Dwight, and a daughter Karen.

Survivors include a brother Gale (Janet) of Temperence , Michigan, sons Wendell (Cindy) of Cookeville, Tennessee and Dwight (Lori) of Latty, Ohio,15 grandchildren, 39 great-granchildren and four great-great grandchildren. He was preceded in death by his parents, a sister Christine and brother Darl, his beloved wife Dorothy, son Lonnie (Shirley) and daughter Karen (Ron).

He repented of his sins and was baptized into the death of the Lord Jesus in the Latty Apostolic Christian Church in November 1947 where he remained a faithful member until his death.

An avid beekeeper, he formed W. Stoller's Honey, Inc. with the help of his wife Dorothy in 1952. Eventually, three of their children also joined the family business. He faithfully tended his bees for years and was an example of hard work. He retired in 2009 at the age of 83.

In his younger years, he served as a Sunday School teacher in the Latty Apostolic Christian church, as mayor of Latty and was an active member of the Gideons International.

Anyone who knew Wayne could remember his ability to talk to anyone, and his sense of humor.

Due to COVID, the family held a private funeral service at the Latty, Apostolic Christian Church with burial to follow in the church cemetery on Saturday, November 7.

Memorials may be made to Gideons, Paulding Senior Center, Country Inn or Apostolic Christian Alms Fund.

Queen Sequestration

(Quarantine)

Charlie **Vanden Heuvel**

Within the United States honey bee colonies have been devastated by the onslaught of the *Varroa destructor* mite. The cost, both in labor and materials, since the *Varroa destructor* mite arrived, has dramatically impacted the bottom line of commercial beekeeping entities. For the novitiate, the learning curve is steep and often costly as hive losses necessitate additional purchases of packages or NUCs.

The Honey Bee Lifecycle has four distinct stages: 1) egg, 2) larval, 3) pupal, and 4) adult. The queen lays an egg which remains in this state for three days. On the fourth day the egg hatches into a larva. There is consistency in the beginning stages of brood development within a colony.

The life cycle of the *Varroa* has two distinct phases: 1) Reproductive Phase – takes place within the honey bee brood cell, as the foundress mite propagates her young, and 2) Dispersal Phase – adult female mites travel and feed on adult honey bees, usually designated as phoretic (traveler) phase (Mondet, et al., 2018).

Foundress (female) *Varroa* mites may produce approximately one daughter per worker brood cell while two or more daughters may emerge from a drone cell (Ramsey et al., 2019). The foundress mite is stimulated to enter the honey bee brood cell by perception of kairomones, a chemical signal, indicating to the foundress mite that the brood has matured sufficiently to be capped.

Varroa is a dangerously efficient vector of several bee viruses, which has dramatically worsened the virus landscape (Manley et al., 2019). We have under-estimated *Varroa's* adaptive ability: the mite has expanded its host range multiple times, has excellent chemo sensing abilities (Plettner, E. et al. 2017), engages in chemical mimicry (Le Conte, 2015), and manipulation of its host (Xie, X. et al., 2016, Chan 2012), readily disperses within and between colonies (Peck et al., 2019, Xie et al., 2016), engages in parental care (Donze et al., 1994), and rapidly evolves acaricide resistance (Rinkevich, F., 2020).

By feeding on bee tissues, *Varroa* acts as an efficient vector of pathogens between bees. Vector-based disease transmission involves three main phases:

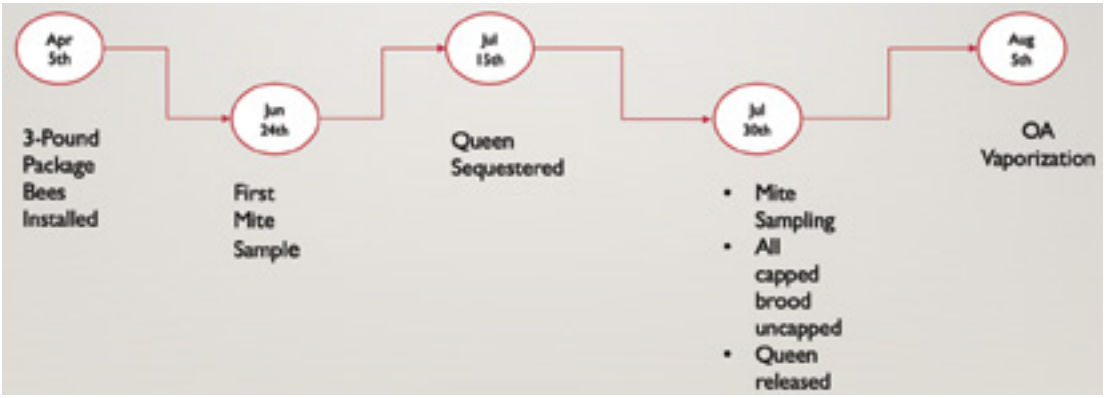
- Acquisition: *Varroa* feed on bee tissues, ingesting the pathogens that reside in those tissues
- Mobility: *Varroa* moves freely between different individual hosts
- Transmission: during feeding, *Varroa* introduces either secretions or partial gut content into the new host to complete the transmission.

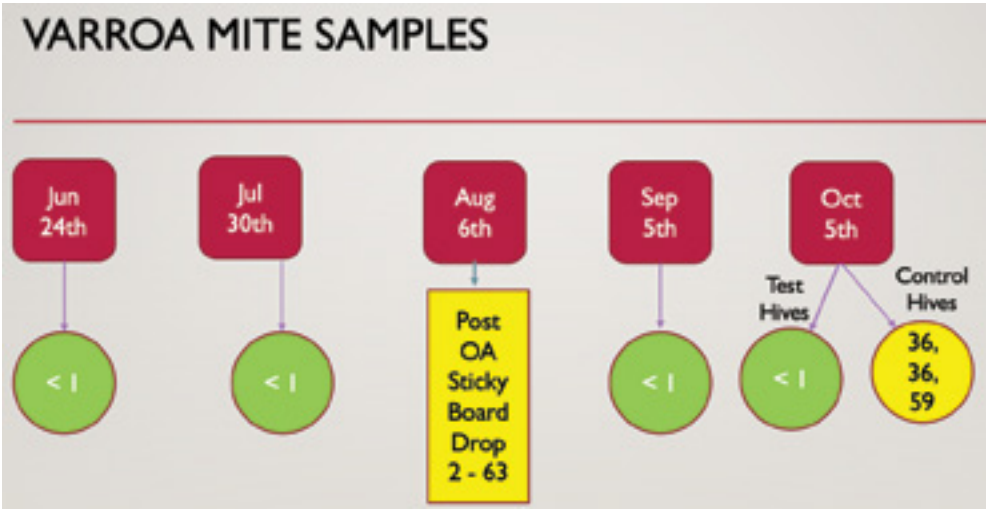
Brood Break, or sequestering the queen, thus interrupting the cycle of brood production simultaneously forestalls the ability of *Varroa* to propagate their offspring as the mite is reliant on the honey bee brood. Caging the queen creates an artificial brood interruption period (Rosenkranz, et. al. **2010**; Giacomelli et al. **2016**). Queen caging in combination with acaricide applications can increase the efficacy of *Varroa* control to >96% (Jack et al. 2020; Pietropaoli et al. **2012**; Giacomelli et al. **2016**, Gregorc 2017). Temporarily caging the queen can also be combined with removal of capped or un-capped brood, which has led to >93% control efficacy (Calis, et. al. **1999**).

A Queen Sequestration Cage was designed to allow the queen to be isolated from egg laying and brood cells while allowing her pheromones to continue to communicate her presence within the colony.

A key factor was to prevent any worker bees from becoming egg layers in the absence of the queen mandibular pheromone coupled with the absence of brood ester pheromone (BEP) (Maisonnasse et al., 2010).

The cage utilized a standard medium foundationless frame. It was constructed with two sheets of #8 Hardware Cloth stapled to each lateral side of the frame. An entrance/exit hole was provided on the top and bottom of the frame with sliders to close these entrances off. The Queen is introduced into the frame through the upper entrance by sliding the metal closure over exposing a circular hole in the upper frame piece. A funnel was



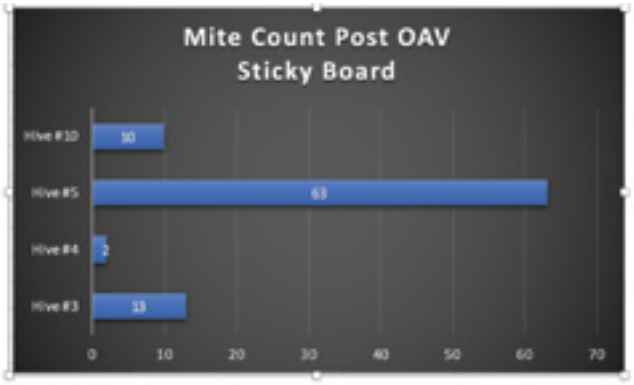


inserted into the entrance hole. The queen was located in the hive, captured with a queen capture tool and deposited into the funnel. No attendants were included in the sequestration frame. Feeding of the queen was through the screen.

Nine hives were selected for the project. Three-Pound package bees were purchased from a commercial operator in California, who treated the colonies in their operational practice. All hives were populated with package bees installed April 5th into eight-frame Langstroth hives. Sugar syrup (1:1) was provided throughout the test period. A pollen substitute patty sprinkled with granules of fresh pollen was applied at the time of package installation.

Four hives were placed in an apiary in Hood River, Oregon as control colonies while five were placed in an apiary in The Dalles, Oregon, approximately 30 miles east. The two separate locations were chosen to prevent potential drift contamination between the experiment and control hives. In the latter, the queen was to be sequestered, while the former were controls.

Varroa mite sampling was conducted every 30 days beginning June 24 on the two groups of hives sending them to the USDA Agricultural Research Service Beltsville Maryland to alleviate potential sampling bias. Samples of approximately 100 bees from a brood frame with nurse bees were collected by 'snapping' the frame of bees into a large white tub. A four-ounce plastic specimen jar (100 cc) was used to scoop up bees from the tub. Isopropyl alcohol 70% was then added to the sample container to kill and preserve the sample.



The graph above demonstrates the mite counts post OA vaporization assessed via sticky board 24-hour period.

The experiment started on July 15. Queens were located and sequestered in the queen sequestration cage. The queen remained caged, unable to lay eggs for fourteen days. A 14-day period of isolation of queens was selected to ensure that upon her release only capped brood within approximately seven days of hatching remained in the hive.

Prior to releasing the queen from her isolation cage, all remaining capped brood cells were broken open. This meant all remaining brood was killed with exposure of any resident mites. The purpose of uncapping any remaining brood cells was to expose all brood cells that may have housed mites.

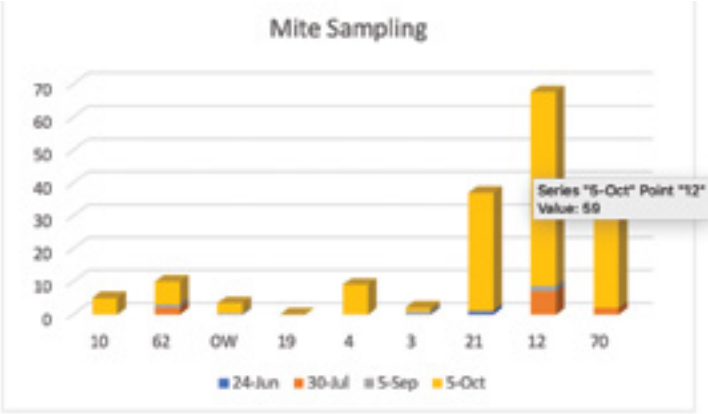
Five days post queen release from her cage (nineteen days post initial removal from egg production), the hive was treated with OA via vaporization per EPA #91266-1 guidelines. Appropriate protective personal gear was worn. A commercial, Varomorus Durable OA 12V vaporizer application wand was attached to a 12-volt battery. A ½ teaspoon (1 gram) OA crystals was added to the heating plate. Initially a test was conducted outside the hive to ascertain the time necessary to heat the OA to insure a complete vaporization.

A 'sticky board' was inserted into the bottom board along with taping off upper entrances. Both test and control hives were subjected to the same treatment of OA vaporization. Twenty-four hours post treatment the 'sticky boards' were removed and fallen mites on each 'sticky board' counted.

On October 5th Formic Pro pads were applied to all hives using the directions from the manufacturer (two pads per hive placed on top of the brood frames) for a period of fourteen days. Sticky boards were placed in their slot under the bottom boards to prevent Formic acid vapor from escaping during treatment.

An OA dribble (Charriére 2012) was applied to all hives on December 5th using 35 grams of Oxalic crystal to one liter of sugar syrup (1:1) mixture applied at the rate of 5-ml per frame interspace where bees were evident. No more than 50ml of the treatment was applied to any hive.

Data developed by sampling both control and test hives for *Varroa destructor* mites returned similar low to zero levels from initial sample date of June through September. The sampling conducted on October 5th



In the graph above mite counts are depicted per hive per sample month. The Test hives (10, 62, OW, 19, and 4) demonstrated less mites while the control hives (3, 21, 12 and 70) had higher mite counts.

demonstrated a dramatic shift. Test hives continued to demonstrate mite levels less than 1% while three of four control hive mite counts demonstrated increased mite infestation of 3.6% to 5.9%.

The process of sequestering the queen for a period of time appears to have had an impact on mite production. The timing of the brood break, post nectar flow, coupled with an OA vaporization treatment reduced the mite counts in the test hives. The control hives, in spite of being treated with OA vaporization alone, did not fare as well as they exhibited higher mite counts.

The sticky board mite counts, 24-hour post OA vaporization (July 31st), was the result, presumably of removing brood capping's exposing mites housed in the brood. Mite counts at time of the release of the queen from the queen sequestration cage, analyzed by USDA Beltsville Bee Lab, showed essentially 0 to 1% on July 30th just prior to removing the capping from brood cells. Since the queen was sequestered for 14 days, preventing any brood development, the mites dropping to the sticky board were the result of those housed in the capped brood cells which were opened prior to OA vaporization. Those mites, in the reproductive phase exposed from their brood cells were evidenced on sticky boards post vaporization.

Marked queen inside the cage.

This research project was a part of the third level of the Oregon Master Beekeeper Program. BC

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You Should Always Ask Questions, The Bigger The Better. If You Ask Big Questions, You Get Big Answers.

Some Influential Bee People I Never Met

James E. **Tew**

Yes, we had cars when I was a kid

In my life's experiences, I have found that very old people and very young people speak their minds. Upon a visit to my ninety-five-year-old grandmother, she giggled an old lady chuckle, and bluntly said, *"Jimmy, you are fat*!"

From the clear blue sky, my youngest grandson recently asked, *"Grandpa, when you were a kid, did they have cars?"* Yes, they had cars when I was a kid, but no, we did not have the hugely powerful internet nor camera phones. Just a few decades ago, I would not have been able to conceive of streaming video. Feeling much like a beekeeping fossil, I learned beekeeping by talking (and listening) to others, reading, looking at bad 35mm photographic slides, and very rarely watching a 16mm movie that had been produced by professionals. Armed with my newly acquired expertise, I would jump in the deep end of the beekeeping pool, and frequently flounder. Over time, using these archaic methods, I learned a bit about beekeeping.

Beginning beekeeping is a world unto itself. In our early beekeeping years, finding the queen all by yourself or watching a worker bee "be born" were exciting events. Ironically, decades later, these small beekeeping occurrences are still entertaining, but a bit old hat. As is required of all beekeepers, that was my early beekeeping world - making mistakes, reading introductory publications, listening, and asking questions.

After being discharged from the U.S. military, I wasn't sure what to do with my life. I decided to go to graduate school and specialize in entomology. All those years ago, entomology was primarily pesticide driven, so I planned to become a pesticide specialist. While on that path, I literally stumbled into beekeeping, a specialized aspect of entomology. At Auburn University, Dr. Paul Estes, my advisor for my master's degree, perceived my bee interest and encouraged me to pursue that avenue. Earlier in his life, he himself, had taken a basic bee class, but unlike me, he never lost his mind over beekeeping.

Ronald Ribbands

On his entomology book shelf, Dr. Estes had copies of only two bee books: *The Hive and the Honey Bee* and *The Behavior and Social Life of Honey Bees* by Ronald Ribbands. One day, after glossing eloquently about beekeeping to Dr. Estes, he took Ribbands' book from the shelf above his desk and told me to read it and keep it. He felt that I needed it more than he did.

Indeed, I did read it and it unexpectedly opened the portal to the next level of beekeeping for me. This was not a book about installing eyelets or making sure that hive body handholds faced outwardly. This was my first true exposure to scientific bee behavior and bee biology. It literally helped me leave the beekeeping kiddie pool and move to the large, deep, beekeeping pool. My Dad had already admonished me saying, *"Jimmy, you cannot make a living with your hobby."* Not wanting to become too sentimental here, but Ribbands' information was not hobby information. It was a compendium of the best honey bee science of the day produced by beekeeping scientists and professionals of that time (1953). No, this was not a hobby. Due in part to this book, with Dr. Estes's support, I gave up on the pesticide circuit and moved into the academic beekeeping world. I never met Professor Ribbands or heard him speak, but his book had a definite influence on my bee life.

A confession

Dear reader, I feel a need to offer a written confession. My concept for this article was to present two to three beekeeping authorities, now passed

Ronald Ribbands. (IBRA photo)

and who I never met, but who had a contributory effect on my budding honey bee interest.

It was a component of my destiny that Dr. Estes pulled Professor Ribbands' book from his bookshelf. Not intending to diss the good professor, but it could have been any number of other established scientists who had published results of their work. I had no hand in the selection. My confession is that while it was easy for me to select my #1 unmet authority, I must have about eight meaningful contributors in my #2 slot. I have unintentionally begun a ranking that I did not intend. Yet, Editor Jerry limits my written space, so I must comply.

S.E. Snodgrass

I am surprised that I selected Dr. Snodgrass's book, *Anatomy of the Honey Bee,* as one of my #2 spots. My interest and appreciation for this anatomy text was actually preceded by the text used in an insect morphology class that I successfully endured earlier. The text for the class was the archetypal, *Principles of Insect Morphology,* also by Snodgrass. This may have been the most educational, but yet most tedious entomology read, that I have ever undertaken. While slogging through the names of innumerable insect parts and pieces, I discovered that Dr. Snodgrass had published a specific honey bee anatomy text. Since my interest in all things bees was unbounded, I was able to make the transition from general insect morphology to more specific honey bee structures and parts. I found that change to be much more palatable.

If you decide to digest the material in this book, I need to prepare you for a serious undertaking. The information contained in this text is not casual reading, but when you get through the book, you will be an accomplished honey bee anatomist. Occasional refreshers will be required. I never met Dr. Snodgrass or heard him speak, but his books had a definite influence on my bee life.

Karl von Frisch

Time and again, in my early bee life, it was noted that von Frisch had been awarded the Nobel prize for his work on honey bee dance language communication. The 1973 award came in the category of Physiology or Medicine and was shared with Nikolaas Tinbergen and Konrad Lorenz. To date, this is the only Nobel award made for researchers who study insects.

Another confession that I should make is that, initially, I simply could not understand the dance diagrams presented in Professor von Frisch's work. Figure eight layouts and sun orientation in two dimensions on the written page did not compute for me. Yet, I had to keep at it. This was a huge event in the academic bee world, and everyone else seemed to understand the material.

I don't remember when or where, but at some point, I was able to translate the 2D diagrams into the 3D world in which I live and keep bees. Once you see it, you see it. I have several of the Professor's books and have grown in my appreciation for the complexity that the bees exhibit in their personal lives. Though I remember his death event, I never met Professor von Frisch or heard him speak. His books, however, had a definite influence on my bee life.

Enough…

I can sense that this avenue of thought is wearing thin. I will not be able to review all my other "#2s" without bringing you to tears. Authorities like C.C. Miller, John Free, L.E. Snelgrove, Charles D. Michener, and E.O. Wilson will have to go unmentioned. But before I leave this, just one last review of a general bee book by Eckert and Shaw.

John E. Eckert and Frank R. Shaw[1]

Of course, *ABC and XYZ of Bee Culture* and *The Hive and the Honey Bee* were staples in my early bee life, but for me at that time, there was a third book, simply titled *Beekeeping* by Eckert and Shaw. I read and appreciated this text and found it to be a source of alternative information to the two most famous texts of that time. It is a friendly, readable text. As both *ABC* and *The Hive and the Honey Bee* were regularly updated and republished, *Beekeeping* became more and more dated.

After a couple of decades passed, and since email did not exist at the time, I wrote letters to MacMillan Publishing Company in New York to ask their plans for updating and rewriting this text. It took a while, but I finally got a response telling me that the heirs to the authors still held the publications rights. I tried to write to them, but no response. I moved on. All these years later, I still find this a meaningful book, but it has become a dated text. In my earliest years, this book was one of my big three. I never met either Eckert or Shaw, or heard them speak, but their book, *Beekeeping*, is one of my foundational bee texts.

R.E. Snodgrass. (ARS photo)

Karl von Frisch (Nobel Archives)

[1]Oddly, I was unable find photos for either Eckert or Shaw. But I did find that Eckert took three degrees from The Ohio State University and that he was from Wooster, Ohio, my current home town. Essentially, Eckert was a neighbor of mine – but separated by decades and decades. Isn't beekeeping interesting?

I am an amalgamation

Writing this piece for you has made me realize that I am a mix of all the bee authors whose work I have read, all the talks I have sat through, all the beekeepers to whom I have spoken, and my bee life's personal experiences. I have left out, by necessity, a ridiculous number of contributors, and I have no idea where you, the reader, could find copies of the texts to which I have referred. No doubt, you have your own special sources. As you grow in beekeeping, these early aids will be meaningful to you.

A subject change – in a way

Last month, I became embroiled in my annual washboard behavior interest. Though I am afraid that you might, I never tire of speculating about this behavior. I gave the subject my best shot last month, but I went on too long and squeezed out space for one of my points of observational hive interest – gallarasis. Due to hazy contaminants on the inside of the observation hive glass, I struggled with poor quality photos that pictured this common wax moth condition.

In fact, the haze on the glass negatively affected all my observation hive pictures. In unenlightened exasperation, I suddenly asked myself, *"What is this hazy material that is so pervasive on the inside surfaces of the glass walls?"*

It would appear to be time for my monthly admission that my comments here are not science, but simple conjecture. I'm guessing the haze is caused by innumerable bees walking on propolis/wax comb surfaces, and then – over time – transferring that mixture (propolis) to the glass surface.

Since I have admitted that I talk to myself, I then asked myself if this thin-film mixture offered bactericidal protection to the hive occupants? Then I surmised – ergo, no science – that if this propolis haze is on the glass, it must also cover all the inside surfaces of the observation hive, and most likely, even coat the bees. Therefore, if I am seeing this film in my observation hive, it would logically follow that it would be found coating the insides of any honey bee nest cavity.

My partial thoughts then culminated in the broad question, *"Does this thin film offer antimicrobial protection to colony members?"* That followed with my wildly speculative supposition, *"Are the wash boarding bees that I (apparently) see throughout the hive laying down this thin film, or is it simply a biproduct of thousands of dirty bee feet?"* Both? I don't know.

Some of the authors whose books affected my bee endeavor.

My monthly best guess is that this film doesn't hurt the colony and is most likely beneficial to the colony inhabitants. You and I know, from the beekeeping literature, that propolis is a major colony product and that it is biologically active. While we as beekeepers bemoan the ever present propolis mess on our hands and the increased difficulty in removing soundly stuck frames, I suspect that propolis is vital to a healthy, productive colony. *(So, what would this mean for a 3-pound package installed on new equipment? Is that new colony more biologically vulnerable? Get ready – I don't know.)*

Once again, any comments I had planned to make on gallarasis have been squeezed out. Spoiler alert – I am guessing that this wax moth condition is more prevalent than we know, but I will again try to review this condition next month.

Final word about this film business

Propolis is obviously an important component of honey bee nest ecology. I wish we knew more about it. Any of you feed propolis? Any of you offer gum supplements to your colonies? Any of you cultivate plants specifically for gum sources for bees. Nope. In every other way, we provide for our bee colonies, but when it comes to propolis (gum), the bees are strictly on their own. They clearly want this stuff.

Thank you

I always appreciate you reading my ramblings. Clearly, without readers, a writer serves no purpose. Thank you. BC

Dr. James E. Tew, Emeritus Faculty, Entomology, The Ohio State University and One Tew Bee, LLC; ***tewbee2@gmail.com; http://www.onetew.com***


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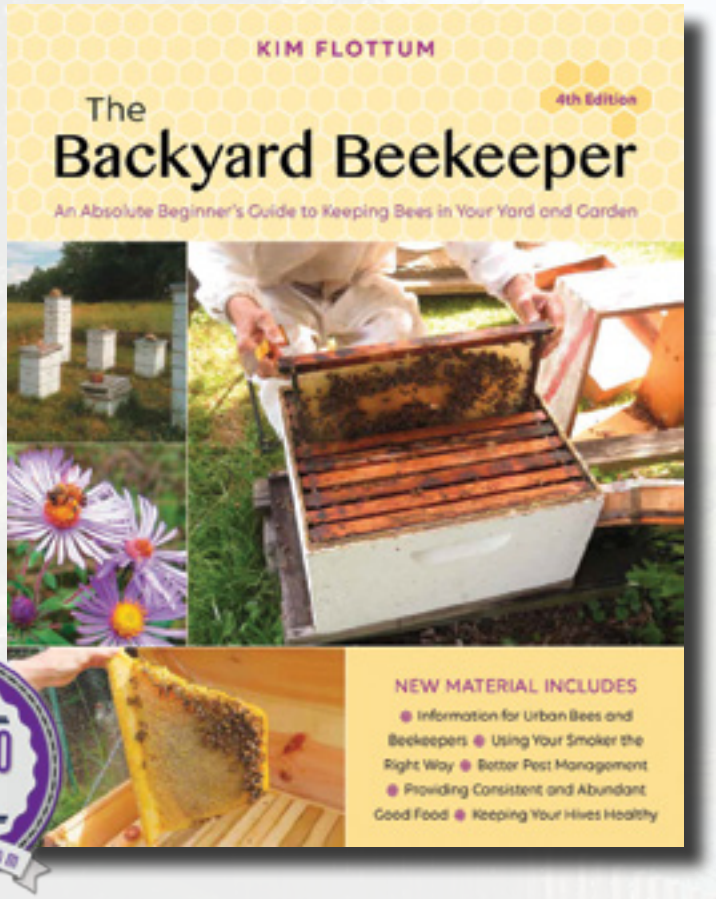

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