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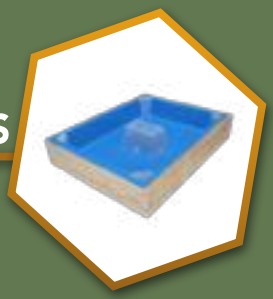

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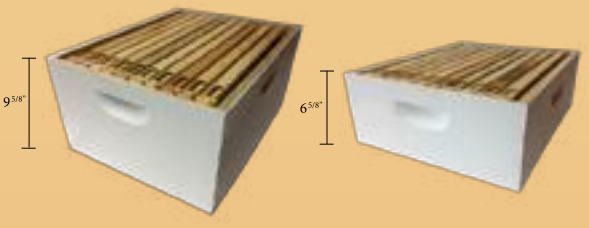

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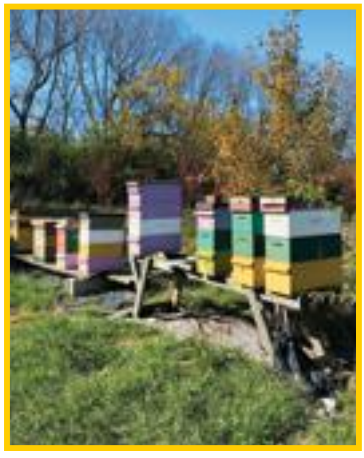

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Contents

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Are Your Colonies Ready to Overwinter?

Successfully overwintering your colonies can be a complicated task. From large commercial operations to backyard hives, beekeepers need to prepare for wintering in the heat of the summer. Seasoned beekeeper, Tom Nolan shares his key steps to getting bees ready for winter—so you can be cracking into stronger, healthier colonies in the spring!

1. MONITOR MITE LEVELS

Determining your colonies' mite counts is critical to inform if you should treat before the winter brood is produced. Ideally, mite counts should be performed monthly. Use a simple alcohol wash, sampling from a frame with older larva (just before capping) to get the best example of a hive's mite count. The typical threshold to prompt treatment is 1-3% infestation—about 3 to 9 mites in a sample of 300 bees.

2. TREAT FOR VARROA MITES

Flexibility is key for fall treatment. *Mite Away Quick Strips™ (MAQS)* and *Formic Pro™* allow you to treat at the end of the honey flow (2-3 brood cycles before Queen goes off-lay), while the last super is still on. The ready-to-use strips make for easy application and quick treatment periods. *MAQS* and *Formic Pro* are all-natural products made with formic acid, killing Varroa mites in the dispersal phase (phoretic) that are found on adult bees and mites under the brood cap, where they reproduce.

3. ENSURE PROPER FEED

Providing your colonies with ample feed stores is essential to keep honey bees healthy over winter. You should commence feeding after your last honey pull, in late summer or early fall. There are a variety of feeders available, 2:1 liquid sucrose in a bucket top feeder is a tried-and-true method for overwintering. Remember: do not feed during *Formic Pro* or *MAQS* treatment period and ensure hives are well-fed before winter wrapping.

4. WRAP YOUR HIVES WELL

Bee Cozy™ Winter Hive Wraps prevent unnecessary heat loss, conserving feed stores over the winter and assisting your bees to brood up faster—so you can split earlier in the spring and be ready for the honey flow. Wrap once temperatures are consistently below cluster point (50°F/10°C), and remove when temperatures are consistently above cluster point and the possibility of snap freezes have passed.

Watch How-To Videos at youtube.com/NODApiaryProducts

Tom Nolan is the Founder and Past President of the *Urban Toronto Beekeepers Association* and lead Sales Representative for *NOD Apiary Products*. His personal mission: to ensure the sustainability of honey bee health. Tom shares his enthusiasm for honey bees by educating beekeepers on best management practices, Varroa control, swarm catching and by volunteering at an organic farm—all while running his successful beekeeping operation: *Hivetown Honey.*

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Want to hear more?

Contact us to book Tom as a guest speaker for your Bee Association:

info@nodglobal.com

Learn more about *Mite Away Quick Strips, Formic Pro & Bee Cozy Winter Hive Wraps* at www.nodglobal.com

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Probiotics

Dear *Bee Culture* editor Jerry Hayes:

After reviewing the Western University, Ontario Canadian white paper Chmiel JA, Daisley BA, Pitek AP, Thompson GJ and Reid G (2020) *Understanding the Effects of Sublethal Pesticide Exposure on Honey Bees: A Role for Probiotics as Mediators of Environmental Stress.* Front. Ecol. Evol. 8:22. **doi:10.3389/fevo.2020.00022**, I would like to address a few points.

The authors propose that probiotics are a solution to the pesticide problem. Specifically, lactic acid bacteria (LAB) can degrade or sequester pesticides from the gut of the honey bee, thus minimizing pesticide absorption. Direct and indirect benefits of LAB to honey bee colonies are summarized.

The last question that is addressed in this article is how to give probiotics to the bees. The authors mention three possible methods: powder supplement, sucrose syrup and pollen patty. In conclusion, the authors write: "Until chemical agents are no longer used in agriculture, the ability to supplement honey bees with probiotics could help the insects fight the unintended pernicious effects."

Jerry, this paper as published, omits several critical thoughts on honey bee microbial understanding.

Please let me share with you several key concepts that could be highlighted.

1–Microbials naturally are abundant in nature. When mother earth is pristine the microbiome is healthy. When anti-microbial chemicals are used in agriculture, they are destructive to bacteria, archaea, viruses and fungi. Honey bees naturally forage for beneficial microbials when they collect pollen, nectar and water.

2–Bacteria as Pathogens. While only about 5% of bacterial species are pathogenic, most bacteria and fungi are beneficial.

3–The symbiotic relationship naturally occurring with beneficial microbials is with grasses and trees, not yogurt.

4–Many of the beneficial bacteria are anaerobic, they must survive in low oxygen environments.

5–When freeze dried bacteria are added to honey bee feed syrup, the lactic acid bacteria (LAB) will quickly die.

6–The half life of LAB bacteria in bee feed syrup is about 24 hours. In several days, the anaerobic bacteria will all be dead if added to bee feed syrup. Freeze died bacteria and fungi are stable and viable while in the dry state.

7–Other bacteria strains have a symbiotic relationship with anaerobic bacteria as oxygen eaters. Bacillus species are aerobic, sporulating, rod-shaped bacteria that are ubiquitous in nature.

8–Let me suggest an analogy, what do you get when you add one lemon to a pond of water? You do not get lemonade, no, you get pond water. It would take thousands and thousands of lemons to create lemonade out of a volume of pond water. The same is true in the microbial world.

9–Many researchers have run trials with colony forming units (CFU)'s of bacteria at the 10^6 concentration per gram. That is the same as one lemon in a pond. Because of the size and diversity of the microbial community in a honey bee hive, it takes billions and billions of beneficial bacteria and fungi to suppress pathogens in a honey bee hive.

10–Beneficial bacteria and fungi suppress microbials that could cause harm to the hive by excreting enzymes and lactic acid.

11–When bacteria and fungi are freeze dried and placed in mylar bags, the shelf life is years, not months.

12–If freeze dried bacteria and fungi are applied in a powder form, they are dispersed by the house bees like a microbial bomb. The dry living bacteria and fungi are electrostatically attracted to the body hairs of the house bees.

13–While the beneficial bacteria and fungi are dispersed, they inoculate the combs in the hive and become a reservoir that can be used later by the honey bees as needed in the hive.

14–In collaboration with microbial scientists, I have completed field trials of beneficial microbial applications. LD 50 studies were performed with cups and cups of freeze-dried bacteria, enzymes and fungi at concentrations of over $1x10^9$ Colony Forming Units per gram. Those hives became my best hives and successfully overwintered. *(Full disclosure: currently collaborating with Strong Microbials Inc, a Milwaukee, WI company)*

15–Using both empirical data and quantitative data, laboratory analysis has indicated that LAB bacteria in the house honey bees increases magnitudes after a dose of highly concentrated beneficial bacteria and fungi.

16–Per the United States Government Food and Drug Administration (FDA), many of the honey bee microbials are on the Generally Recognized As Safe (GRAS) list. They are safe for humans to consume. Honey supers are not contaminated by beneficial bacteria.

17–Bacteria in the mid-gut ventricular, ileum and rectum breakdown amino acids into short chain fatty acids. Then the nutrition of the pollen can pass through the tissue barrier into the bee's blood. Honey bees consume bee feed syrup and pollen substitute patties at a faster rate when there is an abundance of beneficial microbials.

Thank you for allowing me to share these critical thoughts!

Earl Hoffman
Essential Honey Bees LLC
EAS Master Beekeeper
(Full Disclosure: currently collaborating with Strong Microbials Inc, a Milwaukee, WI company)

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Obituary

Go Tell the Bees. Jim Haskell is gone. Jim was the quiet one with his beloved wife Pat Haskell up front. Jim was a stalwart supporter, leader and educator of so many things that strengthened the Virginia Beekeeping community – some of which included the VA Teaching Consortium, the first

intermediate beekeeping class in No VA, queen rearing and bringing that multi-day education to beekeepers, sharing queen genetics among beekeeping club members, bringing many national experts in as speakers, VSBA, EAS, ABF (a speaker at all), promoting a sustainable apiary management via nuc production and more. Jim even turned Michael Palmer into an adjective coining the term to "Palmerize" a colony – a technique to make overwintered nucs out of non-productive colonies. Jim was a leader most prolifically in Northern Virginia and Paige County but he cast a wide net of influence. Jim traveled the State and beyond, sharing his knowledge. A fan of beekeeping history, who knows what amazing collections and archives he had – an antique smoker collection was one. Some of his last communication was publicly shining a light on advice I gave to beekeepers on a listserv- the irony – so much of the foundation of which I had learned from him. I'm sure there is more to remember! Gone Too Soon my friend. Gone Too Soon. Yours,
Karla Eisen

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New Audio Feature

Something new is coming to *Bee Culture!* Beginning with this issue, we are trying out an audio feature for certain articles and authors. To start, we have three authors who have recorded themselves reading through their articles. The three authors are Jim Tew (page 89), Jay Evans (page 17) and Ross Conrad (page 40).

On the first page of each of these three authors' articles, you will find a QR code that will take you directly to their article on our website. Digital subscribers: the text with the QR code that says "Listen along here!" is a link that will take you to the page.

Please note: The audio WILL NOT be available until the 1st of the month. We always try to get your print edition to you by the first of the month, and sometimes that means it will come early. Since it is relatively unpredictable, we choose to post everything related to the issue on the first of the month, which will include this audio. We are sorry in advance for any inconvenience this may cause, but it is best for us and our schedule!

Questions? Email **Emma@BeeCulture.com**

Bee Trap Comment

A comment on the mailbox entry *Bee Trap* in the June 2022 issue submitted by Carl. Rarely, have I put pen in hand to comment about one of your articles in *Bee Culture.* However, this article is so far off base that I would like to comment. I also propose some improvements on its use.

I bought this Bee Wasp trap at Menards, selling for under $12 and Amazon will give you two for $15. I have tried many other types of traps but this one works best. I have no financial interest in the product. No one is paying me to endorse this wasp trap.

Dear Carl,

I am sorry you did not like the product. I have used this bee/wasp trap you described for years. This is the best wasp catcher I have ever used.

I have been a residential beekeeper in the NW suburbs of Chicago for 10 years. I have been called out to catch or dispatch several swarms of stinging insects. None of the swarms have ever turned out to be honey bees. I think most residential honey bees have been dispatched by chemicals, weather, predators, parasites, disease, Winter or legislation. I have beautiful photos of some paper wasp, hornet, yellow jacket or mud daubers nests. The few honey bee swarms that I tried to catch were my own.

I use this Bee Wasp Trap several ways. One use is as a clean-up wasp catcher after removing a wasp nest. Any wasps that were not in the nest when removed return to this trap. I usually leave the trap up in place of the nest for several days. I have repeatedly filled the trap with wasps.

My favorite use for the trap is in my apiary. Wasps continuously bombard my own beehives. Usually in the Fall, the wasps feed on the fruit in my orchard. They also pester the beehives. This trap keeps the wasps under control. I hang the cheery orange and white plastic globe on my fruit tree about 25 feet from my small apiary. The wasps love this product more than life itself.

I believe your lack of confidence in the product stems from your bait. I will give you my best recipe.

Place a heaping tablespoon of cheap, wet, canned cat food in the trap. I use fishy stuff, but any will do. The smellier the better. Then fill the bottom ½ inch of the trap with Welch's 100% grape juice. Other juices may work but I found Welch's 100% Grape Juice is the best.

Hang the trap about 20 feet from your beehives. The wasps find the cat food and sweet grape juice smell irresistible. Once the wasp enters the trap, they will never come out. Wasps have to fly up to leave. The fishy cat food odor repels the bees.

I have filled this trap up to the first bulge with dead and dying wasps. They will stand on their fellow dying wasps and still more come to this trap. I have dumped the trap out and let it fill again. I have never found a single honey bee in the trap. Bee Happy.
Sincerely,
Dan G

The bee/wasp trap that is being referenced from the June 2022 issue.

NEXT MONTH

Region 1
- Wrapped, fed, insulated for Winter
- With the drought, feed, feed, feed
- *Varroa* treatments should have been done two months ago
- Upper entrance
- Mouse guards in place
- Check bear fence, keep Pooh Bear out of bee yard
- Check hive weight

Region 2
- Combine weak colonies
- Make sure colonies have at least 50 pounds of stored food
- Make repairs on equipment, store safely
- Reduce entrances, put on mouse guards
- Put on Winter feed
- Purchase new equipment during Black Friday events
- Read beekeeping "How-To" books. Stay off internet.

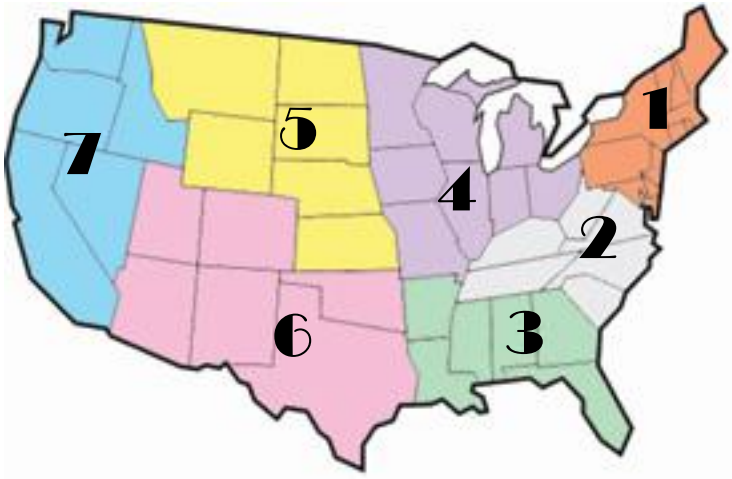
Region 3
- Check food reserves
- Late feeding if needed
- Combine weak colonies
- Prep for California almond pollination trip
- Hive beetles!!!
- Equalize colonies
- Provide wind break
- Add sugar bricks if light on food stores

Region 4
- Food storage check. Need 50-60lbs
- Is equipment structurally sound for Winter?
- Feed, feed, feed
- Monitor and control small hive beetles
- Remove queen excluders if still on
- Treat for Nosema
- Replace rotting equipment

Region 5
- Too late for last mite treatment
- Check feed stores, feed if necessary
- Winterize colonies
- Sell honey at craft shows
- Ship colonies West
- Wrap colonies with insulation
- Equalize colonies

Region 6
- Feed if under 50lbs stored
- Combine weak colonies
- Move dead colonies out
- Move colonies out of 'flood zones'
- Re-queen defensive colonies
- Go to bee conferences
- Cross fingers

Region 7
- Ensure enough Winter stores to get through January
- Move South to Winter yards
- Final wrap using roofing paper for rain protection
- Start preparing for almonds
- You are done. Leave them alone
- Strengthen hive stands
- Feed if needed



Honey Reporters Wanted

We are expanding our Honey Reporter population in EVERY region. We ask that you fill in most of the sections, most months, and our short survey at the bottom. We give you a FREE subscription for your service. So if you are interested fill out the form **https://forms.gle/EnZW531NHM7sbMUz8** OR send an email to **Emma@BeeCulture.com** and put REPORTER in the subject line. Include name, email, phone number and mailing address and we'll get you the next Honey Report form. Sign up today and be a part of the BEST Monthly Honey Price and Beekeeping Management Report in the industry.

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OCTOBER – REGIONAL HONEY PRICE REPORT

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7					
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								Range	Avg.	$/lb	Last Month	Last Year
55 Gal. Drum, Light	2.50	2.18	2.95	2.99	2.74	2.80	3.30	2.00-4.00	2.78	2.78	2.75	2.20
55 Gal. Drum, Ambr	2.28	2.18	2.80	2.93	2.50	2.70	3.20	1.90-4.00	2.67	2.67	2.60	2.03
60# Light (retail)	234.42	241.00	244.67	221.89	206.25	155.67	267.50	80.00-350.00	225.91	3.77	211.88	197.62
60# Amber (retail)	222.91	229.75	229.50	215.29	240.00	150.33	238.75	80.00-300.00	218.57	3.64	218.12	197.19
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	97.66	112.80	110.79	118.80	110.50	96.00	-	64.80-156.20	104.55	8.71	106.17	89.37
1# 24/case	168.17	207.09	163.47	120.32	173.91	107.88	144.00	65.00-288.00	162.38	6.77	162.53	131.19
2# 12/case	159.10	222.00	150.28	112.63	123.84	108.00	156.00	84.00-264.00	149.86	6.24	152.44	121.38
12.oz. Plas. 24/cs	149.75	148.50	130.24	100.69	102.64	114.96	117.60	72.00-250.00	127.52	7.08	124.25	104.27
5# 6/case	159.54	239.40	200.56	115.47	126.87	-	-	90.00-330.00	161.12	5.37	164.41	133.84
Quarts 12/case	192.60	209.67	175.00	138.17	168.06	146.34	201.67	69.24-276.00	178.68	4.96	192.37	154.65
Pints 12/case	113.75	174.00	99.25	98.87	106.30	120.00	115.10	60.00-180.00	112.03	6.22	121.54	97.81
RETAIL SHELF PRICES												
1/2#	6.31	7.13	5.00	4.88	5.40	8.00	-	3.00-10.00	6.09	12.17	6.25	5.48
12 oz. Plastic	8.06	7.62	6.60	6.06	5.81	11.00	7.44	3.40-16.00	7.24	9.65	7.52	6.94
1# Glass/Plastic	10.30	11.19	9.08	7.93	8.45	10.76	9.00	5.00-20.00	9.78	9.78	10.00	8.65
2# Glass/Plastic	17.23	19.29	15.16	13.67	13.85	10.50	17.00	7.99-30.00	16.18	8.09	17.25	15.78
Pint	12.05	14.78	11.60	11.50	10.75	9.46	11.33	5.00-24.50	11.82	7.88	11.84	10.94
Quart	23.18	23.04	19.19	19.78	18.57	20.25	21.08	9.60-40.00	20.76	6.92	21.54	18.75
5# Glass/Plastic	36.72	36.53	42.90	26.12	24.33	34.00	28.00	17.99-65.00	34.87	6.97	34.91	30.50
1# Cream	11.53	11.00	9.99	10.00	10.44	-	13.00	7.96-20.00	11.04	11.04	11.35	10.10
1# Cut Comb	14.10	15.04	11.60	12.66	12.00	-	10.00	6.00-25.00	13.33	13.33	14.86	13.97
Ross Round	13.43	11.07	15.00	12.50	-	-	15.17	8.00-20.00	13.30	17.74	13.82	10.98
Wholesale Wax (Lt)	9.21	7.82	6.30	7.53	6.67	5.50	4.28	3.00-17.00	7.68	-	8.41	7.21
Wholesale Wax (Dk)	7.23	6.38	5.25	5.69	7.00	4.25	8.50	3.00-15.00	6.58	-	6.69	6.21
Pollination Fee/Col.	89.00	74.08	92.50	107.50	103.00	-	100.00	6.00-200.00	90.94	-	94.57	93.10

Please note: anywhere within each region that there is a '-' it is because no information was sent to us for that specific item in that region.

The American Honey Producers Association's Annual Convention will be here before you know it! Mark your calendar and plan to join us at the luxurious Westin La Paloma Resort and Spa in Tucson, Arizona, November 29 through December 3, 2022. This resort has every amenity you could ask for, including a gym, spa, pools, tennis courts and three nine-hole golf courses. Of course, there are also shopping and dining options galore both on site and within minutes of the resort.

The goal of the AHPA Annual Convention is to educate and inform our members while providing the opportunity to meet new people, create new opportunities, and learn about the latest happenings in our industry. This year, our keynote speaker is Dr. Jamie Ellis from the University of Florida. We will have presentations from some of the nation's top bee scientists as well as updates from Project *Apis m*, Bee Informed Partnership and many more.

Our convention will kick off with a new special event on Tuesday afternoon, November 29 – a golf tournament! Tuesday evening will be the annual meet and greet. We hope you take this opportunity to catch up with old friends and meet new ones! The presentations from our great lineup of speakers will begin Wednesday morning, November 30, and continue through Friday afternoon, December 2. We hope you will also be able to take advantage of our Wednesday night Happy Hour from 8pm – 10pm. On Thursday afternoon, December 1, you will have the opportunity to tour the USDA ARS Carl Hayden Bee Research Center. You will have the chance to ask the scientists questions and see what they really do in their labs. Friday evening will be our banquet and auction. If you have not participated in the banquet and auction previously, please make plans to do so this year! It's always an evening of great food and fun! Saturday morning, December 3, will be the Board of Directors meeting and final comments from our President, Mr. Chris Hiatt.

A hot topic at this year's convention will be the status of the Anti-Dumping Lawsuit and its effect on current honey prices. The American Honey Producers Association has been a driving force behind this suit that benefits every beekeeper. Many of you are already reaping the

benefits of this suit. While the lawsuit has been the significant cause of increased honey prices, there is a downside. That downside is the enormous cost of filing the suit itself. We are still short of paying the initial bill to the lawyers and more legal fees are coming. There are appeals to file and that means more money. Last year, many members donated a nickel for every pound of their crop. We are asking those who have not donated to join the Nickel Club by donating $.05 for every pound of your crop to help pay the legal fees. We currently need $500,000 to cover the estimated cost of the remaining legal fees and appeals.

The special golf tournament is a fund-raising event for the Anti-Dumping Fund. Members and vendors alike can take advantage of this opportunity to enjoy this exclusive, extremely well-maintained, Jack Nicklaus designed course in the beautiful Sonoran Desert.

Our goal is to raise $10,000 from this tournament. All profits will go to the Anti-Dumping fund! This is a great opportunity to show your support for the AHPA. We can reach this goal if we have participation from both vendors and AHPA members. We need both sponsors and players. It doesn't matter if you're an experienced golfer or have never golfed before; we need your participation. The maximum number for this event is 48, so sign up now at **https://ahpa-golf-tournament.perfectgolfevent.com/** Everyone who registers as a player before October 4th will be eligible to have their green fee waived.

The tournament will be an 18-hole, two-man scramble event starting at 1:00 PM on Tuesday, November 29. The entry fee of $200/player includes use of the practice range, green fees with a cart (one cart/team), and a player's gift that includes golf balls. There will also be a hole-in-one contest with winners' choice of a HummberBee or Bobcat forklift! Prizes for 1st, 2nd and 3rd place teams will be awarded (depending on the total number of players).

Help us raise money for the Anti-Dumping legal fees and have some fun at the same time!

If you don't want to play, we will gladly accept donations of any amount to the Anti-Dumping Fund. We ask that you do what you can to support AHPA and our efforts to support our industry. The AHPA cannot do this without your help.

No matter the size of your bee business, organization or even your golf skill level, we want you to join us in Tucson! Vendors can contact Cassie Cox or Steven Coy for more information and sponsorship opportunities.

Hope to see you there!

Steven Coy – Vice President American Honey Producers Association

Canadian Honey Council

Rod Scarlett

While the final overwintering losses for Canada were not very good, the concern remains about what happens next year. There are many questions as to what caused the huge loss in numbers – was it resistance issues, viruses caused by *varroa*, weather issues, nutritional issues, management problems, a combination of these or something else entirely. Not knowing exactly the cause means that high losses might be an ongoing problem and not just a one-off. Trying to prepare for next year has resulted in planning for both short-term and long-term solutions based on a myriad of possibilities.

Certainly, one of the more controversial solutions has been the call to allow for packaged bees from United States, specifically from northern California. In response to the question as to stock health, the CFIA issued the following:

In keeping with its commitment to work with industry, stakeholders and academia, and its mandate to prevent the introduction of animal diseases into Canada, the Canadian Food Inspection Agency (CFIA) is issuing an official call for any new, documented scientific data/information (since 2014) regarding honey bee health in the United States and Canada. The CFIA is issuing this call to help determine if there is sufficient scientific evidence to warrant a re-evaluation of the risks associated with the importation of U.S. honey bee packages… The deadline for submission of scientific data/information is September 5th, 2022.

Importing packaged bees from the U.S. is one option, but not the only one. The CFIA is completing risk assessments for importing packages from both Italy and Ukraine. Of course, the current situation in Ukraine complicates matters but the two countries represent new options and combined with New Zealand, Australia and Chile, they could realistically supply all Canada's demands for bees. Then there is the matter of increasing domestic supply. There is huge opportunity for the development of a far more dynamic nuc industry. Combine this with improved internal individual stock replacement strategies and the reliance on imported stock could easily be reduced. But this is likely a more long-term goal, a goal that will certainly have a positive impact on most enterprises.

One area that needs particular attention, however, is the pollination sector. While the primary objective is to lower overwintering losses, because of timing, it is apparent that currently, importing stock is the only viable option for stock replacement. This year showed how precarious the relationship is between those who need pollination services and those who supply pollinators. As the demand for pollination services grows (and it grows in those areas that don't have vast numbers of colonies) the beekeeping industry is going to have to adapt and find innovative ways to meet the demand. Moving bees across Canada is a significantly different challenge than that of our U.S. counterparts. We must find a way to meet the pollination needs across Canada or a stock replacement strategy may be imposed whether beekeepers like it or not.

All images in this gallery submitted by Greg Carey.

Image Gallery

Splitting Colonies

STUDY HALL

HONEY BEE WINTER SURVIVAL

QUESTION

Very good article in Catch the Buzz about beekeeping in North Dakota. But, I would like to know what the small-time beekeepers do in North Dakota to get through the Winter. Here in Minnesota, a lot of the backyard beekeepers lost a lot of hives last Winter. Minnesota's beekeepers are tight lipped when it comes to information on what they did to get their hives through the Winter.

D. Johnson

ANSWER

According to BIP, and others, most of the losses by backyard beekeepers is because of the lack of consistent sampling for *Varroa* multiple times of the year, then treat if over three mites per 100 bees according to label directions, then sample again to see if treatment worked is rarely being done. Long-lived Winter bees are different than short-lived Summer bees. Winter bees are being produced now and if they are negatively impacted by *Varroa*/*Varroa* Virus Legacy they don't live as long and 'poof' colony is dead over late Winter/early Spring.

This topic has been highlighted many, many times and few backyard beekeepers actually are Beekeepers but rather Beehavers.

Commercial beekeepers, according to the BIP survey, lose fewer colonies over Winter. I wonder why?

'Tools for *Varroa* Management Guide', **https://honeybeehealthcoalition.org/wp-content/uploads/2022/08/HBHC-Guide_Varroa-Mgmt_8thEd-082422.pdf** I tell all beekeepers to memorize this.

OA MEGA TREATMENTS

QUESTION

Can you please point me to research on damage done to antenna so I can share it with knucklehead neighboring beeks who hit them every four days with mega doses?

Thanks, Mark Donovan

ANSWER

I hope your beekeeping buddies know that ⅔ of *varroa* are reproducing/hiding behind capped brood cells at this time of the year. That means that multiple OA or formic treatments don't do much other than let the queen get hit every time. One treatment in January or February when there is no brood or little brood can control phoretic (exposed) *Varroa* mites pretty well. Doing it now is simply adding collateral damage to the colony getting ready for Winter… or not.

https://www.researchgate.net/profile/Erik-Tihelka/publication/328200942_Effects_of_synthetic_and_organic_acaricides_on_honey_bee_health_A_review/links/5bc24d02a6fdcc2c91fb762d/Effects-of-synthetic-and-organic-acaricides-on-honey-bee-health-A-review.pdf

"Some acaricides have been shown to affect the physiology of adult worker bees. Formic acid treatment had a significant effect on the number of sensilla found in the bee's antenna. Non-significant differences were recorded for the mean length and surface area of the sensilla. Topically administrated oxalic acid is known to penetrate keratin and can subsequently be detected in the bees internal organs including the digestive tract, rectum and heamolymph, which it can damage and cause elevated mortality."

TAKTIC???

QUESTION

What is Taktic? I keep hearing it at our beekeeper meetings in side conversations.

B. Cantrell

ANSWER

It is a product that contained amitraz and was originally used in the livestock industry. Some beekeepers early on with *Varroa* discovered it and used it off label and with multiple treatments to treat for *Varroa.* With amitraz resistance being found in *Varroa,* and the legal, effective, labeled products losing effectiveness because of illegal use of Taktic, it has been taken off the market.

HOT BEES!

QUESTION

I have ended up with some very grumpy colonies collectively which has been a struggle as we have tried to breed for demeanor as well and up to this year, have only encountered the occasional "hot" colony that needs dealt with. I brought in some new VHS genetics last Summer and was attributing the aggression to possibly these genetics, despite not having had that be an issue before with VSH bees, but these came from a different breeder.

They were requeened and still dealing with collective aggression which brings me to my hypothesis that I pitched to my wife Ella over the weekend as I was getting my hands stapled by the bees. We reside within the "catastrophic" damage area of the New Madrid Fault line. They have predicted catastrophic destruction within this area since I was a kid. I actually remember a time in sixth grade where they had it pinpointed to the day that the quake was going to happen and being scared to come

home from school as no one else would be there at the time, lol.

So I mention this because the only other time in which I had the majority of an out yard go aggressive on me was when there was drilling being done within 100 feet of the hives as the workers drilled down about 30 feet through slate to lay water lines. This went on for a day to which several hives absconded and I had trouble righting that apiary collectively the rest of the season.

Now, having a handful of apiaries spread out amongst four different counties but all within the fault line, do my bees sense something is going on beneath the surface that us mere mortals cannot detect and are really unhappy about it?
Jeff Kennedy

ANSWER

I think I have said this before, 'Anyone who says they know everything about honey bees or fault lines is a liar'.

Not sure about fault lines and earthquakes and geologic movement from fracking etc. influencing honey bee defensive behavior.

The honey bee 'grumpy gene' is carried by the drone. So your grumpy worker bees are just telling you about Dad. Wherever your DCA is, there will be drones from there to miles away. There's also drones from packages and nucs from all over the South which local beekeepers have purchased. The southern U.S. and California has AHB genetic introgression. Just saying.

From Jeff

Ah yes... one of my nearby farmers brings in package bees every Spring. Joy!!

BEES SLOWING DOWN

QUESTION

Is it normal when I look through the inner cover at night (this is when I change my sugar syrup), sometimes I see the bees, but they are moving slow now? It's about 65°F out during the day, they are active and the queen is laying but cooler at night.
P. Zablocky

ANSWER

Remember that honey bees are insects that do not have a metabolism that creates significant heat. They are not like your warm dog or cat or you, whose temperature is at 98.6°F, which allows you to maintain activity when the outside temperature drops below that.

Honey bees respond to temperatures of between 57°F to about 100°F for inside activity and outside foraging. Think of a honey bee colony like a thermometer. As the temperature rises, the colony spreads out to allow airflow to remove excess heat (they don't sweat) and become much more active. When the temperature drops, then the individual bees find their sisters and the colony group contracts and snuggles up together at about 57°F, called a Cluster, to try to maintain a temperature by muscle wiggles and movement to keep the queen, the only fertile female, warm and their genetic future from being damaged.

So in your example, if it is 65°F during the day, then they are above that cluster temperature of 57°F but moving less actively than if it were 80°F. They are getting ready for Winter and practicing.

I hope that helps.

POLLINIA

QUESTION

In **https://www.beeculture.com/milkweeds-honey-plants/** it was stated "However, there are potential negative aspects to milkweed flowers. It is conceivably possible for bees and other small pollinators to become trapped in a blossom."

I was trying to figure out why I have seen so many small pollinators (western honey bees, hawthorn mining bees, flies and an unknown moth) hanging upside down dead in my large milkweed patch. I freed a western honey bee once and it was extremely difficult to do without hurting her.

Thank you for providing such useful information. I hope this information will be helpful.
P. Richardson

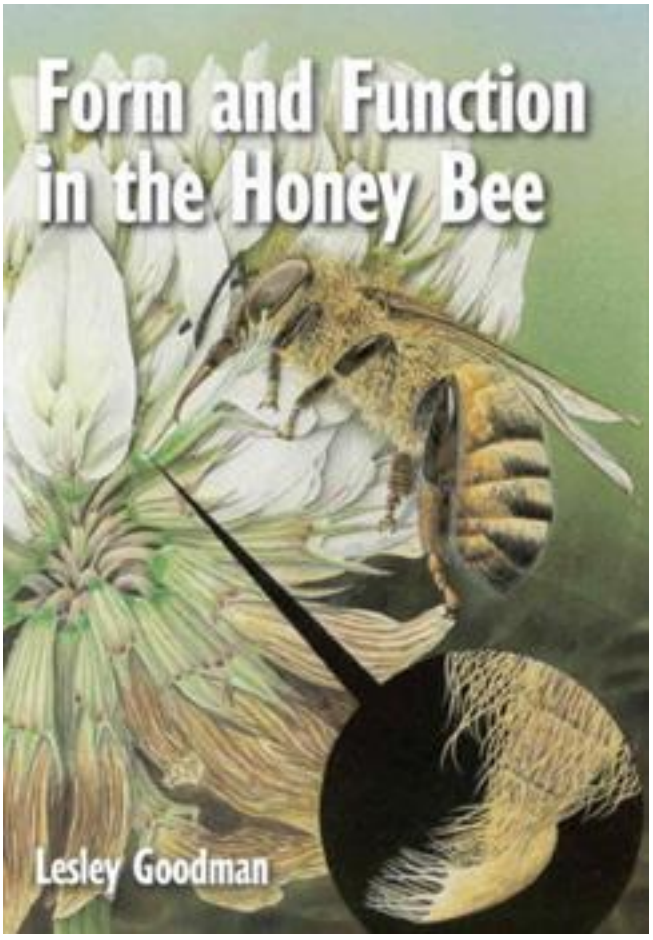
ANSWER

https://vtecostudies.org/blog/a-flower-trap/#:~:text=Unlike%20most%20flowers%2C%20milkweeds%20don,stick%20to%20an%20insect%E2%80%99s%20leg.

Pollinia... a flower trap. Life finds a way.

Book Review

Kim Flottum



Form and Function in the Honey Bee, by Lesley Goodman. Published by Northern Bee Books and IBRA. Available on Amazon or from Northern Bee Books. 234 pages, color, paperback, 340 illustrations, $50 from Amazon.

The International Bee Research Association (commonly known as IBRA), and Northern Bee Books have together released a new edition of an outstanding book titled *Form and Function in the Honey Bee*, by Lesley Goodman. It was originally published by IBRA, but after it went out of print, they weren't in a position to reprint so it has been missing for a bit.

Dr. Lesley Goodman, the author, completed her PhD work at Liverpool University, moving on to become a reader in Zoology at Queen Mary University in London until her retirement in 1996. Her research interests were primarily in the fields of neurobiology and insect physiology, specializing in honey bee flight and visual systems. Her special interest was in how insect thoracic flight motor machinery was influenced by commands from the brain, and she used honey bees to map the route of visual input to certain flight motor neurons.

Her work with bee scientists and beekeepers led her to produce this book that is readable by both non-scientists and students. Though incomplete when lung cancer overtook her work, she set up a fund to ensure the book was completed and published exactly as she intended. It was completed by Professor Richard Cooter, chair of the L. J. Goodman Insect Physiology Trust, and Dr. Pamela Munn, then Deputy Director of IBRA, who finally published the book in 2003. Lesley's goal was to describe some of the topics that would attract a wide audience rather than a smaller group of insect specialists, and in my opinion she did exactly that. That remains the goal in this edition by contributors and the publishers.

In my office while editor of *Bee Culture,* were three reference books on my desk I used almost exclusively: Lesley's book, the most current *ABC and XYZ of Bee Culture*, which, at that time, was edited by Dr. Shiminuki, Ann Harman and myself, and the most recent *Hive and The Honey Bee*, which then *ABJ* editor Joe Graham put together. Between those three, I could find almost anything honey bee, beekeeping, insects, flowers or whatever I needed. The current ABC, edited by Keith Delaplane and Lesley's book are the two that sit on my desk now.

The book covers, essentially, the form, or anatomy, and the functions of the various anatomical parts she looks at. Basically, it's an anatomy and physiology book looking at honey bees. It's a big book in every way. It measures 12 inches by 8.25 inches, has 221 pages, over 340 diagrams, paintings, SEM photos and line drawings.

There are nine chapters, but each is a PhD's worth of information.

The first studies the antennal sense organs, sorting out the sense of smell and the olfactory receptors, how tasting works for bees, sensing humidity, temperature and carbon dioxide, how the antennae work with hearing and finally, using them to interpret the dance language.

Next comes vision, looking closely at the compound eye, how colors are seen, or not, and using polarized light to navigate to and from anywhere they happen to be. Chapter three is short and to the point looking at the ocelli, or the simple eyes.

Chapter four focuses on how gravity affects the bees, and, what organs are used to measure this force. Neck hairs, petiole hairs and leg hairs seem to make this work.

Mouth parts are next. All the mouth parts and what each part does. And how do bees drink, anyway? You'll find out here.

There's a short chapter on collecting pollen, followed by a chapter on breathing, getting oxygen to every cell that needs oxygen, all of the time.

Flight was one of Goodman's specialties and it shows in chapter seven. She looks at the evolution of flight, aerodynamics, structure of wings, why there are pairs of wings, how they are moved, which requires studies in detail of the anatomy of the thorax, flight muscles, distances, mating flights and muscle temperatures allowing flight.

Chapter eight looks at the pheromones of bees. Nasonov, queen, tarsal, glands, footprint pheromone and all the rest, and beeswax… making it, its composition, getting it outside the body and then comb building.

Her book finishes with defending the colony – the sting, venom, lancet movement, alarm pheromone and why the whole apparatus is so complicated.

If there's something you want to know about honey bee anatomy or physiology, you will find it in this book, beautifully detailed in art, SEM's or line drawings. It's the only book you will need.

Form and Function is available from Northern Bee Books or Amazon. Check it out.

FOUND IN TRANSLATION

I've just gotta bee me!

Jay Evans, USDA Beltsville Bee Lab

Listen along here!

Picture peeping into an observation hive or simply watching a pulled frame of calm worker bees. You will soon notice a range of different acts by the bees in your view. Some might be burrowed into cells, some will be engaged in intimate conversations with nestmates, some will be carrying hive debris and some will be doing a happy dance after bringing back pollen or nectar. It has been known for decades that worker bees advance through different tasks as they mature. The primary shift is from 'nursing' or nest behaviors while bees are young, to foraging behaviors as they grow older. Young bees produce a nutritious processed food that they use to provision brood, and younger bees also produce the wax needed for hive partitions. Older bees, typically around two weeks old, start a life of foraging when outside conditions permit. If you want to read more about life's big changes among social insect workers, including this switch from indoor to outdoor tasks, read the review article *Regulation Of Division Of Labor In Insect Societies* by Professor Gene Robinson (**https://www.researchgate.net/profile/Gene-Robinson/publication/21615667_Regulation_Of_Division_Of_Labor_In_Insect_Societies/links/5738cf9a08ae9f741b2bd8a1/Regulation-Of-Division-Of-Labor-In-Insect-Societies.pdf**), a review which has held up well since being published 30 years ago.

But these major transitions are not the whole story. Gazing into our lab's observation hive makes me think of the picture books by Richard Scarry I read while young (you can't go wrong with his book *What do people do all day?*). In these books, everyone is shown doing a specific trade, reflecting the many workers needed to make societies function. Bees are onto that as well, by specializing to some extent on certain hive roles. The specialization is subtle in the face of typical life transitions. Most bees, if they live long enough, will fly from the hive as they mature and initiate foraging. Similarly, most young bees will do some nursing. But there are deviations from this path. Some bees are known to be 'precocious' foragers, perhaps reflecting a stress faced earlier in their lives or perhaps reflecting their particular genetics. While foraging, some bees might prefer pollen to nectar on their floral trips, while others might tend to favor resins from plants, or water. In the nest, some bees are better linked into the social web than others and some might linger on particular observable tasks. In short, a bee is a bee; a replaceable but non-identical part of the whole colony.

Recent technical advances allow researchers to both measure and analyze the behaviors of bees throughout their lifespans and in a social setting. Numbered tags, similar to those put on some queens, have been used to keep track of individual worker bees for decades. Newer tags are both more 'apparent' to hive sensors and have a far greater level of discrimination, allowing hundreds or thousands of bees to be followed at once. Professor Robinson's group has deployed this technology to tackle bee health issues ranging from the impacts of infection and chemical stress on bee behavior to a better understanding of the underlying neurodiversity of bees and how this diversity is driven by age and genetics. One example of this line of work comes from a paper with Tim Gernat as lead author (Gernat T, Rao VD, Middendorf M, Dankowicz H, Goldenfeld N, Robinson GE (2018) *Automated monitoring of behavior reveals bursty interaction patterns and rapid spreading dynamics in honeybee social networks* Proc Natl Acad Sci 115:1433–1438. **doi:10.1073/**

pnas.1713568115). My favorite insight from this paper was that bees did not inherently recognize each other as individuals, and therefore bee-to-bee feeding was driven by chance encounters and immediate cues, rather than some shared memory of prior encounters. The paper is highly technical, in part because the authors want the results to be general to all society interactions, including our own. It is also impossible to analyze so many interactions without classifying each encounter in a strict mathematical way.

If that paper catches your interest, you will also enjoy an upcoming paper that tackles individual bee biases ('personality' is probably too strong of a word) that can last throughout their lifetimes. This paper, led by Michael Smith from Auburn University (Smith, M. L., Davidson, J. D., Wild, B., Dormagen, D. M., Landgraf, T., & Couzin, I. D. (2022) *Behavioral variation across the days and lives of honey bees.* iScience, 104842. **https://doi.org/10.1016/j.isci.2022.104842**) ups the bee-tracking challenge by following over 4,000 nestmates as they do their nest duties over an entire Summer. The results are complex and could be scrutinized for months, but there are some interesting guilds or 'clusters' of bees that seem to be on more similar paths than the paths of others. These paths involve the aforementioned age-biased tendencies to leave the nest and fly. Within that split, some groups of bees might be more prone to navigate widely in the nest than others, or to be found hovering around honey stores. And I especially resonated with 'day cluster 4' ("behavioral days associated with middle-aged bees, with metrics representing slow, localized behavior"). That sounds a lot like the past two years for me.

When one looks at the 'lifetime achievement' of individual bees, there are bees that moved to foraging earlier than others (and died younger) but also bees that tended to be more mobile in the nest, and show traits that set them apart from other nestmate groups. In short, whether defined by five clusters (as in this study for bee-days and bee-lives) or three or 20 clusters, there is solid evidence that bees don't all follow the same life journey. It will be fascinating to connect these behavioral quirks with bee genetics (reflecting the dozens of possible paternal lineages in each colony), pesticide exposure, or maybe just a chance encounter of some sort earlier in life that has long-term impacts on bee lives. Honey bees have faced a lot of scrutiny by beekeepers and scientists, but one of the last frontiers is to see how individual members of the colony superorganism deviate enough from the lockstep of colony life to make things perhaps a bit more stable, if not more efficient. It takes a colony to raise a bee, but that bee then has some flexibility in her choices as she navigates cues and events both within and outside her home.

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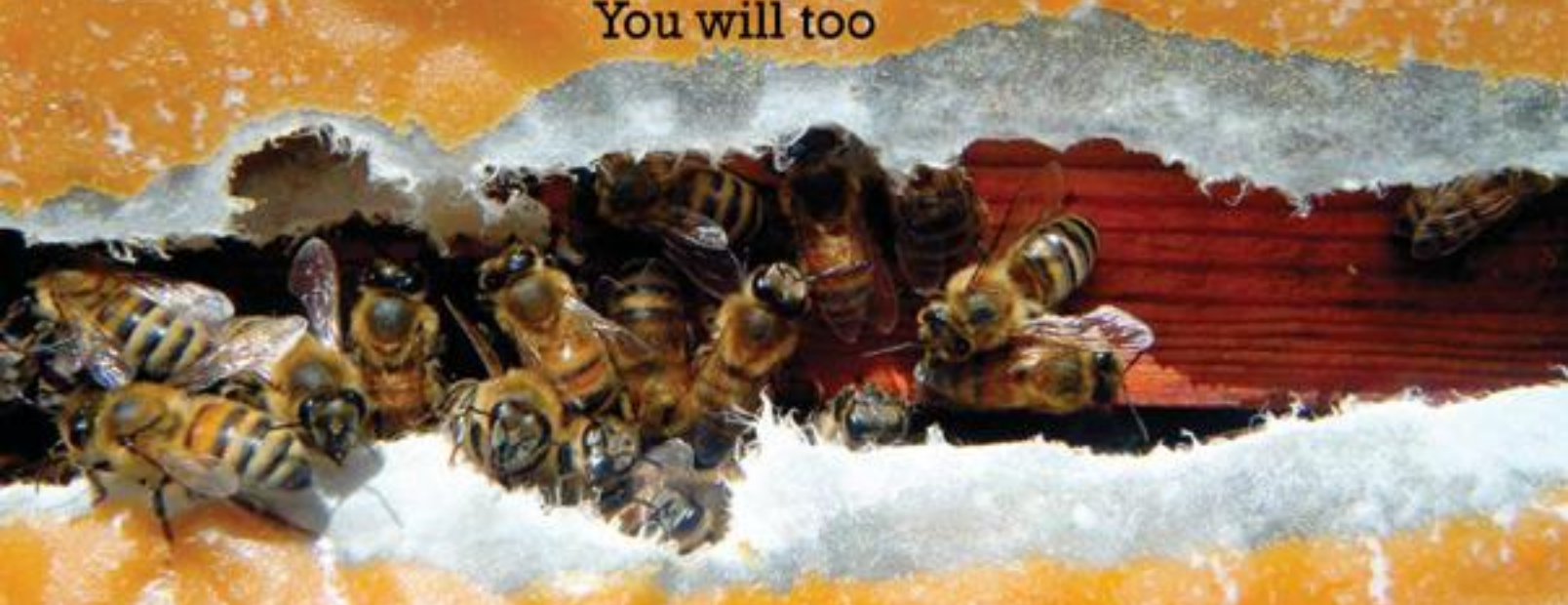

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A Closer LOOK

Caste Determination

Clarence Collison

The capacity of the honey bee to produce three phenotypically distinct organisms (two female castes; queens and sterile workers, and haploid male drones) from one genotype represents one of the most remarkable examples of developmental plasticity. The queen-worker morphological and reproductive divide is environmentally controlled during post-embryonic development by differential feeding. Previous studies implicated metabolic flux (rate of turnover of molecules through a metabolic pathway) acting via epigenetic regulation (changes in organisms caused by modification of gene expression rather than alteration of the genetic code), in particular DNA methylation and microRNAs, in establishing distinct patterns of gene expression underlying caste-specific developmental trajectories. The first genome-wide maps of chromatin structure in the honey bee were produced at a key larval stage in which developmental canalization into queen or worker is virtually irreversible. Extensive genome-wide differences were found in H3K4me3, H3K27ac and H3K36me3, many of which correlate with caste-specific transcription. Transcription is the process of copying a segment of DNA into RNA molecules. Genetic information flows from DNA into protein, the substance that gives an organism its form. The flow of information occurs through the sequential processes of transcription (DNA to RNA) and translation (RNA to protein). Furthermore, H3K27ac was identified as a key chromatin modification, with caste-specific regions of intronic H3K27ac directing the worker caste. These regions may harbor the first examples of caste-specific enhancer elements in the honey bee. These results demonstrate a key role for chromatin modifications in the establishment and maintenance of caste-specific transcriptional programs in the honey bee. It was shown that at 96 hours of larval growth, the queen-specific chromatin pattern is already established, whereas the worker determination is not, thus providing experimental support for the perceived timing of this critical point in developmental heterochrony in two types of honey bee females (Wojciechowski et al. 2018).

Artificial queen rearing with worker larvae grafted at different developmental stages resulted in gradual effects on ovary size (number of ovarioles per ovary), as well as hind leg and wax gland structures in adults. A significant decrease in ovariole number was observed when third instar larvae were grafted. Basitarsus shape was affected when fourth instar larvae were grafted. Queen—worker intermediates developed when early-fifth instar worker larvae were transferred. As newly emerged adults, spectra of cephalic (of, in or relating to the head) volatiles (pheromones) of queens and workers are still very similar, and do not yet exhibit the caste-specific elements of the mandibular glands. At one day after emergence, most of the dominant compounds in these spectra are represented at higher levels in workers (Dedej et al. 1998).

Female honey bees have two castes: queens and workers. Developmental fate is determined by larval diet. Coding sequences made available through the Honey Bee Genome Sequencing Consortium allow for a pathway-based approach to understanding caste determination. Wheeler et al. (2006) examined the expression of several genes of the insulin signaling pathway, which is central to regulation of growth based on nutrition. They found one insulin-like peptide expressed at very high levels in queen, but not worker, larvae. Also, the gene for an insulin receptor was expressed at higher levels in queen larvae during the second larval instar. These results demonstrate that the insulin pathway is a compelling candidate for pursuing the relationship between diet and downstream signals involved in caste determination and differentiation.

Caste determination in the honey bee is assumed to be determined by the dietary status of the young larvae and translated into physiological and epigenetic changes through nutrient-sensing pathways. Illumina/Solexa sequencing was employed to examine the microRNAs (abbreviated miRNA) content in the larval food. They found that worker jelly is enriched in miRNA complexity and abundance relative to royal jelly. The miRNA levels in worker jelly were seven to 215 fold higher than in royal jelly, and both jellies showed dynamic changes in miRNA content during the fourth to sixth day of larval development. Adding specific miRNAs to royal jelly elicited significant changes in queen larval miRNA expression and morphological characters of the emerging adult queen bee. They proposed that miRNAs in the nurse bee secretions constitute an additional element in the regulatory control of caste determination in the honey bee (Guo et al. 2013).

A female larva's developmental fate depends on its diet; nurse bees feed queen-destined larvae exclusively royal jelly, a glandular secretion, but worker-destined larvae receive royal jelly for three days and subsequently jelly to which honey and beebread are added. RNA-Seq analysis demonstrated that p-coumaric acid, which is ubiquitous in honey and beebread, differentially regulates genes involved in caste determination. Rearing larvae in vitro on a royal jelly diet to which p-coumaric acid has been added produces adults with reduced ovary development. Thus, consuming royal jelly exclusively not only enriches the diet of queen-destined larvae but also may protect them from inhibitory effects of phytochemicals present in the honey and beebread fed to worker-destined larvae (Mao et al. 2015).

The development of queen and worker castes is induced by differential nutrition, with future queens and workers receiving diets that are qualitatively and quantitatively different. Wheeler et al. (2014) monitored the gene expression of 14 genes for components of the insulin/insulin-like signaling and TOR pathways in honey bee larvae from 40-88 hours after hatching. They compared normally fed queen and normally fed worker larvae and found that three genes showed expression differences in 40 hour old larvae. Genes that show such early differences in expression may be part of the mechanism that transduces nutrition level into a hormone signal. They then compared changes in expression after shifts in diet with those in normally developing queens and workers. Following a shift to the worker diet, the expression of nine out of 14 genes was upregulated in comparison with queens. Following a shift to the queen diet, expression of only one gene changed. The honey bee responses may function together as a homeostatic mechanism buffering larvae from caste-disrupting variation in nutrition. The different responses would be part of the canalization of both the queen and worker developmental pathways.

Honey bees use differential feeding and a haplodiploid sex determination system to generate three distinct organismal outcomes from the same genome. Ashby et al. (2016) investigated the honey bee female and male caste-specific microRNA and transcriptomic molecular signatures during a critical time of larval development. Both previously undetected and novel miRNAs have been discovered, expanding the inventory of these genomic regulators in invertebrates. Significant differences in the microRNA and transcriptional profiles of diploid females relative to haploid drone males as well as between reproductively distinct females (queens and workers) were shown. Queens and drones show gene enrichment in physio-metabolic pathways, whereas workers show enrichment in processes associated with neuronal development, cell signaling and caste biased structural differences. Interestingly, predicted miRNA targets are primarily associated with non-physio-metabolic genes, especially neuronal targets, suggesting a mechanistic disjunction from DNA methylation that regulates physio-metabolic processes. Accordingly, miRNA targets are under-represented in methylated genes. Their data show how a common set of genetic elements are differentially harnessed by an organism, which may provide the remarkable level of developmental flexibility required.

The development of a larva into either a queen or worker depends on differential feeding with royal jelly and involves epigenomic modifications by DNA methyltransferases. To understand the role of DNA methylation in this process, Foret et al. (2012) sequenced the larval methylomes in both queens and workers. They showed that the number of differentially methylated genes (DMGs) in larval head is significantly increased relative to adult brain (2,399 vs. 560) with more than 80% of DMGs up-methylated in worker larvae. Several highly conserved metabolic and signaling pathways are enriched in methylated genes, underscoring the connection between dietary intake and metabolic flux. This includes genes related to juvenile hormone and insulin, two hormones shown previously to regulate caste determination.

Regardless of genetic makeup, a female honey bee becomes a queen or worker depending on the food she receives as a larva. For decades, it has been known that nutrition and juvenile hormone (JH) signaling determine the caste fate of the individual bee. However, it is still largely unclear how these factors are connected. To address this question, Mutti et al. (2011) suppressed nutrient sensing by RNA interference (RNAi)-mediated gene knockdown of *IRS* (*insulin receptor substrate*) and *TOR* (*target of rapamycin*) in larvae reared on queen diet. The treatments affected several layers of organismal organization that could play a role in the response to differential nutrition between castes. These include transcript profiles, proteomic patterns, lipid levels, DNA methylation response and morphological features. Most importantly, gene knockdown abolished a JH peak that signals queen development and resulted in a worker phenotype. Application of JH rescued the queen phenotype in either knockdown, which demonstrates that the larval response to JH remains intact and can drive normal developmental plasticity even when IRS or TOR transcript levels are reduced. They found that IRS is an alternative substrate for Egfr (epidermal growth factor receptor) in honey bees. Overall, their study describes how the interplay of nutritional and hormonal signals affects many levels of organismal organization to build different phenotypes from identical genotypes.

Corpora-allata (produces juvenile hormone) activity of queen and worker larvae of the honey bee in late larval development was studied in vitro by a radiochemical assay. Prospective queens showed a high peak of corpora allata activity in the fourth and early fifth larval stadium. This peak coincides with a queen-specific maximum in juvenile hormone titre, demonstrating that modulation of juvenile hormone release is of prime importance in the regulation of the caste-specific juvenile hormone titre. In both castes, hormone release is strictly correlated with juve-

a. Drone, b. Queen, c. Worker

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nile hormone synthesis. The conversion of the precursor methyl farnesoate to juvenile hormone may be regulated caste-specifically, since only in queens but not in workers, a linear correlation between intraglandular contents of juvenile hormone and methyl farnesoate could be found (Rachinsky and Hartfelder 1990).

Queens and workers are alternative forms of the adult female honey bee and represent one of the best known examples of insect polyphenism (two or more distinct phenotypes are produced by the same genotype). Hormonal regulation of caste determination in honey bees has been studied in detail, but little is known about the proximate molecular mechanisms underlying this process, or any other such polyphenism. They report the success of a molecular-genetic approach for studying queen and worker specific gene expression in the development of the honey bee. Numerous genes appear to be differentially expressed between the two castes. Seven differentially expressed loci described here belong to at least five distinctly different evolutionary and functional groups. Two are particularly promising as potential regulators of caste differentiation. One is homologous to a widespread class of proteins that bind lipids and other hydrophobic ligands, including retinoic acid. The second locus shows sequence similarity to a DNA binding domain in the Ets family of transcription factors. The remaining loci appear to be involved with downstream changes inherent to queen or worker specific developmental pathways. Caste determination in honey bees is typically thought of as primarily queen determination; the results make it clear that the process involves specific activation of genes in workers as well as in queens (Evans and Wheeler 1999).

Newly emerged honey bee larvae were reared in the laboratory on ^{32}P-labeled royal jelly. The resulting adults were classified as workers, intermediates or queens, depending on their morphological caste characters. Larvae destined to become queens ate 13% more food than worker larvae during the first three days of larval life. This difference increased to about 40% after six days of larval life. The mean rate of ingestion was 8% less in intermediates as compared to queen larvae during the first three days after hatching, and 16% less after six days of larval life. Queen larvae consumed an average of 5% more royal jelly than intermediates, and 19% more than workers. The results are discussed in relation to the known differences in growth rates of the queen-worker castes (Dietz and Lambremont 1970).

Honey bee larval growth is markedly influenced by the moisture content of the larval food. A gradual increase in the moisture content of the larval food (royal jelly) resulted in a large percentage of queens. An apparent linear relationship of royal jelly moisture content to time of larval development was used in the feeding trials. Since the larval food tested was one and one-half or two and one-half years old, it is probable that a highly labile queen determining substance, or substances, if present in larval food, is not responsible for caste determination. Results of this study suggest that nurse bees may initiate the mechanism of queen differentiation simply by increasing the moisture content of the food of growing larvae and thereby, controlling the intake of essential nutrients. The secretions of the mandibular glands are presumably responsible for the change in consistency of the food of either queen or worker larvae (Dietz and Haydak 1971).

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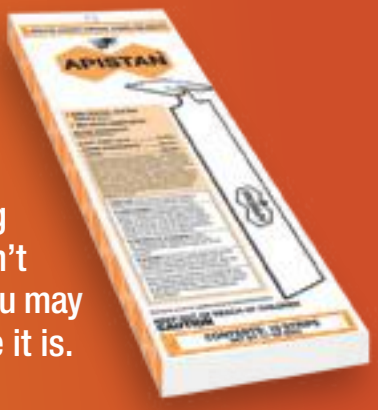

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All The Buzzz in...

Hello Friends,

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Bee B.Queen

Bee B. Queen Challenge

What are your favorite fall vegetables and fruits?

Camille Liu, 13, TX

Bee Pollinated Food from the Fall Garden

We can thank our pollinators for helping to produce pumpkins to make jack-o-lanterns, winter squash to roast, and many apple varieties just waiting to be picked and made into apple pies. Try these two soup recipes featuring all three of these bee pollinated foods from our fall gardens.

Autumn Harvest Soup

- 2 tbsp. butter
- 1 cup diced onion diced
- 1 tsp. salt
- 1 tsp. yellow curry powder
- 1 ½ tsp. cinnamon
- ¼ tsp. nutmeg
- 2 pounds winter squash (butternut or kabocha)
- 1 ½ cups chopped apples cored and diced (Honeycrisp work well)
- 4 cups chicken stock
- 1 cup milk or heavy cream (coconut, almond, or oat milk can be used)

Instructions

1. Ask an adult to help you peel and cube the squash. Microwave a halved squash for 30 seconds to make peeling easier. For tips on how to prepare a butternut squash go to https://tinyurl.com/3rsbrre4.
2. Cut and dice the apple.
3. Melt the butter in a large stockpot. Add the onion and salt. Sauté over low heat until soft and translucent but not browned, 4-6 minutes.
4. Add the curry, cinnamon, and nutmeg. Stir to warm the spices in the butter for 30 seconds.
5. Add the prepared squash, apples, and stock. Bring to a boil, then reduce to a simmer. Cover and cook until the squash and apples are soft, 30-40 minutes.
6. Remove from the heat and purée in a countertop blender or with an immersion blender until smooth and creamy.
7. Add milk and blend. Less milk will make a thicker soup.
8. Serve with a drizzle of coconut milk and roasted pumpkin seeds on top!

ooo Bee kid's corner

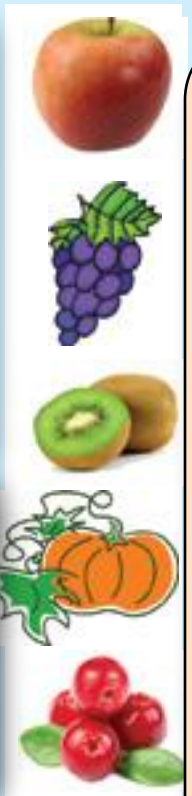
Produced by Kim Lehman, www.kimlehman.com, www.beeculture.com

October 2022

4-H Entomology Camp in Mississippi

Read About the Buzz!

What's black and white and buzzes?
A paper bee costume!
Reuse old newspaper to create a wild, wacky, and wonderful bee costume. Gather materials you have around your house. Things like old posters, plastic caps, corks, scraps of fabric, old clothes, yarn, and string.



Autumn Harvest

Find these foods from our fall gardens that supply pollinators with nectar and/or pollen.

Apples
Cranberries
Grapes
Herbs
Kiwifruit
Mangos
Pears
Pumpkin
Raspberries
Winter Squash

Pollinator Friendly Cookbook

Pollinator Partnership has a cookbook you can download with recipes featuring ingredients that rely on pollinators. There is also a list of foods along with their pollinators.
https://pollinator.org/pollinated-food

Black Bean & Pumpkin Soup

This soup is quick and easy to make.

- 1 large can pumpkin
- 1 large can chopped tomatoes
- 1 large can black beans
- 4 cups of either veggie, chicken or beef stock
- 1/4 red wine vinegar
- 1 or 2 chopped onions
- 4 chopped cloves garlic
- ½ tsp. salt
- 1½ tbsp. cumin
- 1 tbsp. olive oil

Chop onions and add to olive oil in large soup pot and sauté until translucent. Add garlic, cumin and salt. After 30 seconds add red wine vinegar. Add pumpkin, tomatoes, beans and stock. Heat and serve.

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Treatment Free? Treatment Free Is the Only Way to Be!

John Miller

What is the attraction to so-called treatment free (TF) beekeeping?

Treatment Free propaganda infests clubs populated by new beekeepers. It is a false narrative.

It is disingenuous. It is a 100% hive-fatal philosophy. Treatment Free is sometimes proselytized by some of the most ignorant among us. New hobbyists really want to do the right thing, and like a new convert to this week's deeply held conviction, rely on the least qualified who postulate TF as good beekeeping. Newbies want to learn beekeeping; good, foundational beekeeping. Newbies are done a hive-fatal disservice by the TF crowd.

I have done a few mite washes. I've done mite washes with science-driven TF practitioners, Randy Oliver, for one. Oliver will bloodlessly toss a candidate hive from a study if the hive fails to suppress *Varroa.* No blaming others for the failure to control *Varroa*. No blaming corn seed treatments for a hive infested with, but untreated for, *Varroa.* Randy takes responsibility for his positions and his science. If the club TF guru won't do an on-the-spot mite wash – the guru is a fake.

We treat children for polio. We treat children with preventative measures against childhood disease because preventative measures are always, always more productive than redemptive measures. We treat livestock to prevent disease and death. It's less expensive to treat a cow than buy a replacement cow. It's less expensive to put oil in the engine than replace the engine. Many of us got a couple of shots to prevent a COVID infection; and went back to get a booster. Staying out of the hospital is a lot less expensive than watching my mom languish in a hospital ICU because someone would not treat themselves against COVID.

Disease spreads, untreated. *Varroa* spreads, untreated.

In the beehive, the white box sits atop sturdy posts to make it easier to 'keep' the hive.

Hobbyists endlessly fret over the type of inner covers, top covers, drone escapes, excluders, in-hive feeders, jar feeders, entrance reducers, smokers – the fuel therein, the best hive tool, the number of frames. They want to do the right thing. Bee supply houses leverage anxiety to profit – with suggestions the well-meaning new beekeeper grasps for. Some harken to stimulate propolis gathering, because it is the healthy thing to do for a hive. Some sweat over the stove mixing granulated sugar slowly, slowly, slowly because sucrose is better than fructose and my new hive will never dip her tongue into high fructose corn syrup. Hobbyists: spend less time thinking about the hardware and more time thinking about hive well-being.

The orthodox of TF beekeeping neglects, denies a simple, simple hive health toolbox.

A bottle of Dawn. A bottle of water. A half-cup measure. A dish pan. The intellectual honesty to question the TF guru. Take our own mite washes. Every month take a mite wash. It takes about two minutes to do a mite wash. Ledger results. Those counts are facts. Facts are stubborn things.

There is one TF in every club. Plant that hoe! Ring that bell! Stamp those feet! Join me in the round the table march! Treatment Free! Treatment Free! Is the only way to be.

Every TF missionary should perform mite washes, every meeting, from different beekeepers, upon request, **especially** if charging the hobbyist/newbie – who remember – hobbyists want to do the right thing for their hive.

The Bee Informed Partnership has for a full decade, 10 **years** documented thresholds beekeepers can rely on as fact-based science. If your hive throws a 5/100 sample – it's dead. It just doesn't know it yet. The beekeeper who knows this and does nothing about it is a sadist.

Treatment free is honey bee cruelty.

As the *Varroa* infestation intensifies, so too the suffering in the beehive super organism.

In humans we call it multiple system failures; cardiac failure, renal failure, respiration failure.

Beehives suffer too. Reproductive capacity collapses. Foraging efficiency systems fail. Caste task systems flounder. The marvel of the healthy hive superorganism – dies. Chaos overwhelms order; robbing or absconding (entirely abandon a hive or nest) occur. Bees won't tolerate too much neglect. Swarming happens for a reason. Absconding happens for a reason.

Here is the greatest fallacy of TF. Dying hives spread *Varroa*. I detest setting next to three and four framers in almonds. I know they're rotten with *Varroa* and I know when the bloom is over and releases are almost given, those wretched, suffering hives will be robbed on, and the clean outfits setting amongst the lousy outfits will get re-infested. It's how a mite wash gets from

one to 17 in a month. *Varroa* infested hives are a continuous *Varroa* reservoir.

Varroa is just a 35-year warm up for Tropilaelaps.

'Flying Mother Nature's silver seed to a new home in the sun.
Flying Mother Nature's silver seed to a new home.'
Neil Young

If you are of a certain age, you'll recognize the lyric from a 1970 song. I thought the song was about humans destroying the planet (pick your reasons), and in a last desperate effort a few chosen ones depart to save the human species. After the Gold Rush. If you're lucky enough to be a *Varroa* with ears – or a human trying to understand *Varroa*, understand that the 'loading had begun' is the mite's clever way of keeping the reservoir continuous.

TF damages the industry, verb. The bee instinctively does its job to the great benefit of mankind. The honey bee is arguably the most beneficial insect on earth. Why treat it with disregard? Why damage the surrounding village?

TF damages the industry, noun. Millions of dollars are spent annually, just in the sale of packages bees and queens to repopulate dead hives. Hives that did not need to die. A legal, $5 hive treatment that does not damage frames, bees, honey, wax or any other claim is a lot less expensive than a $200 package, right?

Consider a great, but under rated superpower. Changing our mind is an under rated superpower. Question everything. Do not be afraid to change your mind. Listen to your own inner voice about honey bee husbandry.

Lastly, a new book caught my eye. *The Mind of a Bee*, by Lars Chittka.

It might change your mind.

JRM

Off the Wahl Beekeeping

PREPARATION FOR WINTER

Richard Wahl

My First Season

I have to admit that after a fellow beekeeper assisted me in catching my first swarm thirteen years ago, I had no idea what I was getting into. How hard could it be, right? Put some bees in a box and maybe get some honey in a year or two. I soon found this was a far too simplistic idea that I think too many first time beekeepers start with. After a bit of research on the internet, which had far fewer reliable sources thirteen years ago, I managed to cobble enough information together to get me through that first Summer and the following Winter. At the time, I knew nothing about mites but did treat once in late October with Check-Mite strips after reading on the internet about the potential mite problem. I went into Winter after that late June swarm catch with my newly caught charges occupying two, ten frame deeps, no insulation and no early Winter feeding; they were on their own. Researching a bit more from internet sources, I made my first candy board late that Winter and learned a few lessons with that process along the way. I placed the candy board on the hive in mid-February and that was enough to keep them alive into Spring when that hive and a second hive from an early purchased package did provide some honey in my second year. From that inauspicious beginning I increased my hive count each year with a few splits and additional package purchases also often losing a few each Winter. Over the following years, I made mistakes along the way and continued to learn and refine my techniques while getting at least one hive through each Winter with one to four hives through the next five or six Summers. After ten years of trial and error, I have come up with a winterization system that seems to work for me.

Hives under a blanket of snow.

Start Preparing in Summer

The first key component of preparing for Winter is to keep your mite counts under control during the previous Summer. If my mite count tests dictate a need for treatment, I like to treat with Formic-Pro in late June or early July and again in late August or early September. Here in SE Michigan a 1% count in Spring and 3% count in Fall are generally accepted as the point at which a treatment is recommended. There are a variety of treatment options on the market that other beekeepers favor, but I can only relate to what has worked the best for me. Using either the powdered sugar or alcohol wash test provides a fairly accurate mite count. Collecting a half cup of bees for either test method is approximately 300 bees, so divide the mites found as a result of either test by three to get a percentage. Anything over three mites in Spring would reach the 1% threshold while anything over nine mites in Fall would reach the 3% threshold. As the queen starts to be shut down in the Fall, the brood chamber begins to be back filled with nectar, which may become capped honey. Just as the queen begins to lay fewer eggs, which will become the overwintering bees, the mites will be increasing their reproduction rate to take advantage of those larval bees that are building up increased fat stores to get them through Winter. This can lead to a mite population explosion if some intervention is not taken by the beekeeper. No Summer treatment for mites or a heavy mite count in late Fall seems the most likely greatest reason for loss of hives over the Winter in our area.

Another treatment I use is the oxalic acid dribble as late in the Fall or early Winter as possible. While the formic treatment will penetrate under capped cells, the oxalic acid vapors or dribble will not and therefore will not reach those mites under capped cells. That is why the oxalic treatment is used as late as possible when very little capped brood is present. I will get to the specifics of an oxalic dribble near the end of this article. But before the time for the oxalic dribble occurs, feeding your bees in the Fall will also assist in a strong population more likely to get your hive through Winter. In the Fall, any of the feeding systems using two to one sugar syrup by weight or volume will help the new Fall emerging brood build up body fat. So, as soon as honey supers are no longer on the hives, I will add a liquid sugar syrup feeder to my hives. These are usually inside top feeders or inverted buckets over the inner cover hole surrounded by an empty super box. These stay refilled while Fall/early Winter temperatures stay above freezing. If there is a warm week, the bees can easily go through a gallon of sugar syrup if there is no Fall nectar flow going on.

Bucket feeder on a single deep hive.

Sugar feed on wire mesh and parchment paper over hive deep.

When Temperatures Drop

I normally take each of the actions below at the same time, once temperatures are consistently forecast to drop below freezing at night. The first is a switch to a candy board or granulated sugar feed. In my first half dozen years of beekeeping I used candy boards. This is where about five pounds of sugar is dissolved in a cup of water and brought to a rolling boil where the dissolved solution will normally turn clear at the 260°F (127°C) to 270°F (132°C) range while stirring constantly. At this point, when allowed to cool to about 180°F (82°C) and poured into a form, it should solidify to a hard candy state. This hard candy board is set on the hive, candy side down, for the bees to use as a food source over Winter as needed. As an aside, I once assisted a new beekeeper one Spring. She had her son place the candy board on the hive that previous Fall, which he did with the candy side up. It was an honest mistake; the bees failed to come up through the center hole and never touched the sugar candy resulting in the loss of the hive.

Since those first years, I have come up with an easier method that also seems more beneficial to the bees. I staple a one-half inch square piece of hardware wire mesh, often called one-half inch hardware cloth, to a three inch deep super spacer and lay a piece of baking parchment paper on the wire mesh. Several knife slits in the paper give the bees a starting point to chew through to reach the four to five pounds of granulated sugar poured on top of the paper, if it is needed as an additional food source. In addition to providing a supplemental food source, the granulated sugar also absorbs moisture which would otherwise condense and fall back on the bees. Bees can tolerate the cold but cannot tolerate being wet and cold. The first year or two with this method I simply used newspaper. I found that the bees can easily chew through most of the newspaper and much of the sugar falls to the bottom board. With the baking parchment paper they tend to chew through one or two spots and work out from those spots wasting less of the sugar falling to the bottom of the hive. Any moisture hardened sugar can be collected in Spring and reused the following Winter.

Another thing I have found to be useful is a one inch thick piece of foam insulation that just fits inside the outer cover. For several years, I removed this outer cover insulation piece in the Summer. But then, leaving it on year round, I found it decreased the Summer heat radiation through the metal roof of the outer cover which also decreased the amount of bearding on hot Summer days. So, now it is left on year round. I also add an insulation sleeve around the outside of my hives once the temperatures are forecast to be consistently below freezing at night. I use ¼ inch black plastic coroplast sheets measured a quarter inch longer than each side of my hive supers folded at 90° angle on the corners and using gorilla tape on both inside and outside of the first side taped to the fourth side corner. This is the same hollow core material used in campaign signs and can usually be ordered through a local print shop or graphics arts store. One could also use any of the bee blankets sold in bee catalogs or simple wrap a hive with stapled tar paper. Whichever material is chosen, the beekeeper needs to be sure there are bottom and top openings left for the bees to exit and enter on those occasional warm Winter cleansing flight days.

There is one more feature that I have found to be useful to enhance the chance of overwintering success. This is called a Vivaldi board. The commercially sold ones come as one piece, much like an inner cover, with the sides about two to three inches deep matching the size of the other supers on the hive. I simply leave the inner cover in place and over that, set a three inch spacer the same size as my supers. Each spacer has four or five, half inch holes drilled in each narrow end to allow for ventilation. Sitting on the inner cover inside the spacer is a folded piece of burlap which absorbs any moisture coming up out of the hive. I often find the burlap quite damp in the center, but have never seen water droplets that could drip back on the bees as was the case before I started using these homemade Vivaldi spacers with the burlap. The air circulation evaporates most of the moisture gathered by the burlap. I cover the inner cover hole with a taped piece of screen to keep the bees out of the Vivaldi board space. Just under the inner cover is where my wire mesh granulated sugar feeder sits. The outer cover with

Coroplast insulation around hives on a very warm Winter day.

its insulation insert sits on top of the Vivaldi spacer. With the addition of a late Fall or early Winter oxalic acid dribble, I have had an 85% overwinter success rate these past three years, going nine for nine my first time three Winters ago when using all these techniques together. Each of the past two years I lost one or two hives while trying slightly modified approaches. I have learned to go with what works for me which brings up my last treatment technique explained below.

The Oxalic Acid Dribble

Accepted practice states that an oxalic dribble can be done in temperatures as low as 40°F. I like it to be a bit warmer and not get below 40°F the following evening or two. The bees need that time to clean themselves of the moisture that is being dribbled on them. Based on past forecasts, I have done an oxalic dribble as late as November 19 or last year on November 8. Why do I wait so long? First off, bees were still bringing in pollen two weeks earlier after a rainy week. Secondly, I have had late start hives still taking in 2:1 sugar syrup. That indicates the queen has not been fully shut down and there may still be quite a bit of capped brood in the hives as warm Fall temps sometimes allow a much later slow down. I want to have as little unhatched brood as possible doing an oxalic dribble, as that is when it is most effective. One could do an oxalic vapor, but I have not invested in the more expensive vapor equipment and have had good luck with the dribble. Additionally, there are numerous hazard cautions to not breathe any oxalic vapors and the necessity to wear an effective gas mask if using the vapor method. I have done two types of dribble; the first is where in the a.m. I do a 1:1 sugar syrup dribble, followed about three hours later with the oxalic acid dribble. The theory is that the bees cleaning process after a first dribble consume the sugar syrup and by the time of the oxalic dribble, having engorged on sugar syrup, ingest less of the oxalic. They are simply cleaning it off and not eating as much of it, which can be detrimental. When I used this method all nine of my hives came through Winter just fine. The other method was doing the dribble alone without the prior 1:1 sugar syrup "practice." I did lose two hives when I used that method alone. There could have been other factors of which I am not aware; however, I did try to match conditions of each application as best I could each different year. I have found it is better to err with a weaker solution rather than a stronger as it seems to be just as effective. I plan to lessen the oxalic grams by about 10% from that shown in the table (next page) provided by a reputable bee company. I have been surprised by the large amount of mite drop on screened bottom boards after using an oxalic acid dribble, which seems to prove its effectiveness.

Oxalic dribble in progress.

Even if you only need enough for one or two hives, use the five hive recipe and discard any surplus, as it is hard to accurately mix smaller quantities.

My Treatment Method

1. First, get your equipment lined up. Rather than pay $20.00 for an oxalic kit in a bee catalogue (gloves, syringe, 35 grams oxalic crystals, safety glasses, etc.), purchase a 50 ml syringe at most dollar stores or pharmacy chain stores for $1.00.
2. Also buy a package of appropriately labeled and legally approved oxalic acid crystals from any of the major beekeeping supply companies or another local beekeeping

	Oxalic Crystals (g)	Hot Water (g or fl oz)	Sugar (g or cups)
20 hives	35 grams	600 grams or 24 fl oz	600 grams or 3 cups
10 hives	17.5 grams	300 grams or 12 fl oz	300 grams or 1.5 cups
5 hives	8.75 grams	150 grams or 6 fl oz	150 grams or ¾ cups

Table showing mixture amounts.

supply source. Since you will only use 35 grams per treatment for 8-10 hives or 8.75 grams for the five hives mixture, the 340 gram size will last a long time if tightly closed after opening.

3. A pair of rubber or nitrile gloves and safety glasses; the mixture is a mild acid so it can burn, **do not get it in your eyes or on your skin.** It exists in very mild form naturally in rhubarb and leafy greens.
4. A gallon glass jar for the mixture, **do not use plastic as the acid will react with some plastics**. Measure the ml of warm/hot *distilled* water into the glass container. (If you have hard tap water, the crystals do not dissolve as easily as in distilled water.) Dissolve the crystals and then the sugar as it works better in that order.
5. A kitchen scale to measure out your grams. There is extensive research that shows bees can tolerate a stronger mixture of oxalic crystals. Ref: **http://scientificbeekeeping.com/oxalic-acid-treatment-table/** I have been happy with the results of what is considered a milder mixture and my mite counts have been much reduced going into Winter.

Application Steps

1. Lightly smoke your bees down between the frames.
2. Fill your syringe with the medicated syrup to the 50 ml mark or if using a 25 ml syringe fill and refill once.
3. Starting at one end of the frames, dribble five milliliters of the solution along a seam that contains bees. (I like to start at the far end and dribble toward me.)
4. Once you have dribbled five milliliters, you must go on to a new seam. (A seam is the space between two frames or the space between a frame and a sidewall.)
5. After each seam of bees gets five milliliters of solution, you are done.
6. In any case, you should not go over 50 ml per colony of ten frame deeps. If the hive has more than 10 seams, dribble where the most bees are. Alternately, you can give less than five milliliters per seam and do more than 10 seams, but you should not go over five milliliters in any one seam or 50 ml total per colony. My hives have two deeps, one directly over the other so the liquid dribbles down through both deeps.
7. Remember to apply the mixture directly onto the bees. Mixture that lands on the woodenware will be ignored by the bees and not moved throughout the colony.
8. As stated above, I found the technique used by a reputable beekeeper that practiced using a one to one (by volume) sugar to syrup mix in the a.m. and going back through with the oxalic mix dribble three to four hours later.

One last note: My research found that it is not recommended to store unused oxalic acid mixture for more than a day or two as it loses its potency over time. Discard any unused portion. Oxalic acid may be neutralized by adding bicarbonate of soda. This will produce bubbles of carbon dioxide that will dissipate without hazard in a normal environment. Once the acid has been neutralized, the addition of more bicarbonate of soda will not produce any more bubbles. The neutralized solution may then be disposed of by tipping it down the drain. It is worth noting that although oxalic acid is not classed as an RCRA hazardous waste, it is worth exercising some care when handling it. As noted before, oxalic acid occurs in a very mild form in rhubarb and leafy greens. Whether using Formic-Pro, oxalic acid dribble or any other chemical application, follow the manufacturer's instructions or thoroughly research a reputable source before using any mite mitigating chemical. Your beekeeping experience could vary based on your environmental conditions, experience or state of your hives. But if you are looking for some additional winterization techniques, you might give some of these a try. EC

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The Bees at the Ohio Statehouse

Nina Bagley

The Ohio Statehouse bees have a nice ornate iron fence around them. The hives sit high on the hill, looking at the passer byers. They each have the Statehouse seal on them. The grounds around the Statehouse bees are rich with native trees and unique pollinator gardens. It's a hidden secret; one can relax, have lunch on the benches and watch the bees come and go while taking in the Statehouse's view and rich history and listening to the church bells across the way. In February 2015, Tamar Ansel, director of the grounds for the Statehouse, contacted me to advise her on getting started in keeping honey bees. I then reached out to OSBA and the Central Ohio Beekeepers Association for their help in getting bees donated. Rod Pritchard, president at the time, presented the bees from the club, and on April 17th, 2015, we installed two packages of bees at the Statehouse. Tamara and John Hunt were to oversee the bees with my help. I got a call from Tamara in 2019 that she was leaving her position as director and taking a job closer to home and that John Hunt, her assistant, was going to take over her role as a groundskeeper. Now, mind you, John didn't mind helping with the bees, but if asked, he would rather be groundskeeper and not beekeeper.

As the seasons change, so do the bees and beekeepers, so my sister, beekeeper Teresa Parker, and myself are overseeing the Statehouse bees. The bees didn't make it in 2020, so we put new bees in and new queens. We named them after the most powerful Ohio women of all time.

"Queen Victoria"

Victoria Clafin Woodhull was a strong influence and leader in the suffrage movement. She was the first lady to run for president in 1872. She was born in 1838 in Homer, Ohio.

"Queen Belle"

Belle Sherwin was born in 1869, in Cleveland, Ohio. She was the daughter of the founder of the Sherwin Williams Company. She graduated Phi Beta Kappa Wellesley College in 1890 with a bachelors degree. She was influential in the Cleveland suffragist movement and president of the league of women voters.

If you're in Columbus, we invite you to stop by the Statehouse and enjoy the bees and pollinator gardens and the rich history of the Statehouse and bee apiary.

Ohio Queen Bee
Nina Bagley
Columbus, Ohio

Nina Bagley

Bees and Women

Lucinda Harrison of Peoria, IL

Mrs. Lucinda Harrison of Peoria, IL followed in Mrs. Tupper's footsteps (to read about Mrs. Tupper, see the August 2022 issue of *Bee Culture*). Mrs. Harrison, like Tupper was widely known for her writings in *Gleanings in Bee Culture* Magazine. When Mrs. Ellen S. Tupper was arrested in 1876, the bee journals canceled Mrs. Tuppers columns, and Lucinda Harrison saw the opportunity to write for *Gleanings in Bee Culture,* which was her passion, especially telling stories about her experiences in keeping bees. Her articles were published in the Ladies Department and Juvenile Department for *Gleanings in Bee Culture*.

Lucinda Richardson was born in Coshocton, Ohio on November 21, 1831. Her father, Alphens Richardson, and his wife Lucy moved their family to Peoria, Illinois in 1836. They moved to a territory occupied by the Peoria Indian tribe and were among the first families to pioneer the land. Public schooling was underdeveloped at the time and her education was limited, however Lucinda's parents gave her the best education, which was close to what the private schools provided at the time. Lucinda's brother, Sanford, was nine years older than her. He was one of the first students to graduate from Knox College in Galesburg, IL. Her brother, being a teacher at the academy, enabled her to attend the academy for a year. Harrison "found teaching a way of support and self culture". In 1855, she married a prosperous farmer named Robert Dodds of Woodford Co, IL. She went from being a teacher to farmer's wife, but unfortunately he died after two years, leaving Lucinda a widow at the age of twenty-five. Lucinda eventually remarried in 1866 to Lovell Harrison, one of the substantial citizens of Peoria. Lovell's father was a prominent doctor in Peoria, Illinois. Lovell Harrison was a horticulturist in the business of growing fruit trees. Lucinda Harrison engaged in amateur cultivation of small fruits. She was not in the best of health and felt it necessary to have an outdoor occupation with fresh air and sunshine.

Mrs. Harrison describes her ranks into the entrance of beekeepers, "In 1871, while perusing the reports of agriculture, I came across a flowery essay on bee-culture, from the graceful pen of Mrs. Ellen Tupper. I caught the bee-fever so badly that I could hardly survive until Spring, when I purchased two colonies of Italians of the late Adam Grimm. The bees were in eight frame Langstroth hives, and we still continue to use hives exactly similar to those then purchased. I bought the bees without my husband's knowledge, knowing full well that he would forbid me if he knew it. And many were the curtain lectures I received for purchasing such troublesome stock. One reason for his hostility was that I continually kept pulling the hives apart to see where the bees were at and kept them on the warpath. Our home is on three city lots, and at that time I commenced in bee-keeping our trees and vines were just coming into bearing. Meeting with oppositions made me more determined to succeed." "Nothing succeeds like success", she added. (She had been the editor of the Prairie Farmer since 1876, but it was writing for *Gleanings in Bee Culture* and the *American Bee Journal* that she gained a national reputation.)

Mrs. Harrison traveled first class by train to attend several Bee Conventions in Kentucky, Louisiana, New York City, Detroit and Beirut, Syria! After each convention, she would write her story with vigor and originality. Mrs. Harrison was an uncompromising and forthright, candid woman. She held A. I. Root to account in1881. "We entered the hall at Lexington, Kentucky, where the convention was in session; we looked to see who was present that we knew. Failing to see A. I. Root, we thought it takes time and money to attend conventions; and while we are here working to promote interest in bee culture, he is at home making money... We beat the bushes, while he catches the game!" She had candor and wrote about subjects concerning women and bee culture such as, "What I Saw In Central Park," "Some suggestions for Bee-keeping Women to Avoid Moving Heavy Hives in Swarming-Time," "The Reason Why Honey Doesn't Sell" and "Suggestions On Who Should Keep Bees." Although they were childless, Mrs. Harrison had been a mother to several orphan children. With cultivation of small fruit trees and her articles in *Gleanings in Bee Culture*, she was eminently successful.

Mr. A. I. Root writes, "Mrs. Harrison never wavered in her determination to know about honey bees." For a number of years, she ran 100 hives but was unable to attend to the bees due to poor health. Family matters eventually wore on her after several years, so finally her husband started helping her, and agreed with her that the fresh air can add ten years to one's life. She credits beekeeping with "making life more enjoyable, opening a new world and making her more observant of plants and flowers" in the 1891 edition of *ABC and XYZ of Bee Culture*. Mrs. Harrison has a place of honor in the *ABC and XYZ of Bee Culture*; she is mentioned under "Biographies of Noted Bee-Keepers". Her picture is amongst the prominent men in beekeeping: Langstroth, Quinby, Grimm, Cook, Mason, Root, Doolittle, Elwood and France, among others. Mrs. Harrison and her husband both passed away in 1904. Her headstone is engraved, "Lucinda Welch Harrison, Wife of Lovell Harrison 1831-1904, Faithful unto death". She was laid to rest in Peoria, IL. Lucinda Harrison, the lady whose name stands prominent among the successful bee-culturist of the present times is still being talked about for her contributions to bee culture, and for encouraging women to keep bees successfully. May she continue to rest in peace among the bees and flowers, which she loved so much.

Ohio Queen Bee
Nina Bagley
Columbus, Ohio

News Notes

Listen along here!

A new extended release oxalic acid treatment shows great promise in the effort to control *varroa*.

Vermont first state to allow oxalic acid extended release mite treatment

A novel approach to control *varroa* mites is gaining attention around the U.S. that utilizes oxalic acid (OA) extended release (OAE). The first article on OAE appeared in the journal *Apidologie* (Maggi et al., 2015) and described a combination of OA and glycerin that showed effectiveness against *Varroa* for over 40 days after introduction to the hive. Randy Oliver of **scientificbeekeeping.com** has conducted additional trials on OAE but unfortunately this novel approach to *varroa* control has not yet been approved by the Environmental Protection Agency (EPA).

Generally, it is a violation of federal law to use a pesticide, or cause a pesticide to be used in ways that are inconsistent with its label. Exceptions to this regulation are found in the Federal statute that governs the registration, distribution, sale and use of pesticides known as the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). Exemptions are found in FIFRA 2(ee) (1-4) which describe the four special circumstances in which it (a pesticide) is permissible for a pesticide to be used in a manner which is not specifically labeled.

In May of 2022, the state of Vermont became the first state in the U.S. to authorize a 2EE exemption for the use of a method for controlling *varroa* mites through the application of oxalic acid that is not allowed by the label, but is not specifically prohibited by the labeling. The statewide label exemption to allow the use of oxalic acid sold under the brand name Api-bioxal using an extended release formulation for mite control is expected to assist Vermont's beekeepers who have been struggling with the latest dramatic increase in annual colony losses that began around 2007.

So far, beekeepers who have experimented with OAE are reporting very good control of *varroa* and find the extended release oxalic acid formulation greatly decreases Winter colony losses, is gentler on the bees than many other treatments, is safer for beekeepers than many other treatments and eliminates concerns over contamination of honey or wax from the treatment's active ingredients.

Unfortunately it may not be possible for all states to implement a 2EE exemption for OAE. Ideally, the registrant of Api-bioxal will amend their label language with the EPA to include this slow release method of applying oxalic acid so it would become available to beekeepers in all states.

Ross Conrad

EPA ignores own standards when evaluating cancer risks

On July 20, 2022 the EPA Office of Inspector General (OIG) issued a report that found the EPA failed to follow standard operating procedures and requirements in its pesticide cancer risk assessment process.

The report comes on the heels of a U.S. Court of Appeals decision that overturned the EPA ruling that glyphosate, the active ingredient in Roundup, is safe for humans and wildlife. Not only did the court rule that the EPA's "inconsistent reasoning" made its decision on cancer "arbitrary," the court found the EPA violated the Endangered Species Act since the agency had previously admitted that "glyphosate 'may affect' all listed species experiencing glyphosate exposure—that's 1,795 endangered or threatened species," but ignored the Endangered Species Act in its decision.

Montsanto-Bayer's glyphosate based pesticide is the most widely used pesticide in the world and numerous studies have found potential links to adverse honey bee impacts. (Balbuena et al., 2015; Faita et al., 2018; Herbert et al., 2014; Motta et al., 2018)

The failure of the EPA to adequately evaluate pesticides safety should cause those who still have confidence in the EPA to protect honey bees and other pollinators from non-target pesticide exposures and their impacts to rethink their misplaced confidence.

Environmentally: honey is better than sugar

Honey is largely considered the first sweetener used by mankind. It is the only sweetener we use that does not require processing for it to be usable. Today, there are numerous sweeteners that compete with honey for the consumers' attention and dollars. Sucrose which is composed of 50 percent glucose and 50 percent fructose is the most common sugar. It is often called table sugar and is usually extracted from sugar cane and sugar beets.

Sugar is also found everywhere. Not only is it found in foods as a

Honey bees do the lion's share of the work to produce honey, making the golden sweetener the number one choice for the environmentally conscious.

The U.S. Environmental Protection Agency has repeatedly failed to protect human and environmental health in their approval of toxic chemicals for use in agriculture.

main ingredient such as cakes, pies, ice cream, cookies and candy bars, but it is often added to foods that do not naturally contain sugar, such as luncheon meats, baby foods, soups, canned vegetables, cereals and most convenience foods like frozen TV dinners. Sugar is pervasive and its sweet taste is universally enjoyed. Unfortunately, sugar production is also quite harmful to the environment. A July article titled *Sugar Taxation for Climate and Sustainability Goals* (King & van den Bergh 2022) suggests that reducing sugar consumption could help fight climate change, reduce environmental damage from sugar mill pollutants and help prevent the loss of biodiversity.

The sugar mills that process sugar cane consume large amounts of energy and the majority of the time that energy is produced by fossil fuels. Honey on the other hand is produced be bees whose energy requirements are fueled by the nectar of flower blossoms. Any fossil fuels used to produce and process honey is limited to the occasional trips the beekeeper makes to check on the bees during the season, the energy used to extract the honey and the embodied energy that goes into making the hive equipment used to house the bees. As a result, not only is local honey the least environmentally harmful sweetener, but it has one of the smallest carbon footprints of all foods.

In addition, the wastewater runoff from sugar cane fields, sludge washed from mills and plant matter waste produced as a result of sugar production choke bodies of fresh water, absorbing available oxygen and lead to massive fish die offs. In contrast, the only waste produced during honey production is beeswax which can be rendered, cleaned and is a valuable resource used to produce additional products.

Meanwhile, plant and animal habitat is destroyed when fields are created to facilitate sugarcane cultivation which significantly increases biodiversity loss. As honey bees go about collecting nectar to produce honey, the impact that pollination produces helps to maintain biodiversity. The authors of the Nature Sustainability study hint that taxing sugar would be a good way to reduce its consumption but do not suggest how people might replace this ubiquitous sweetener. We beekeepers have the answer: everyone who uses sweeteners should substitute honey for sugar whenever possible.

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Bee Driven Mid-Life Crisis, Part 8
What Have I Learned?

James Masucci

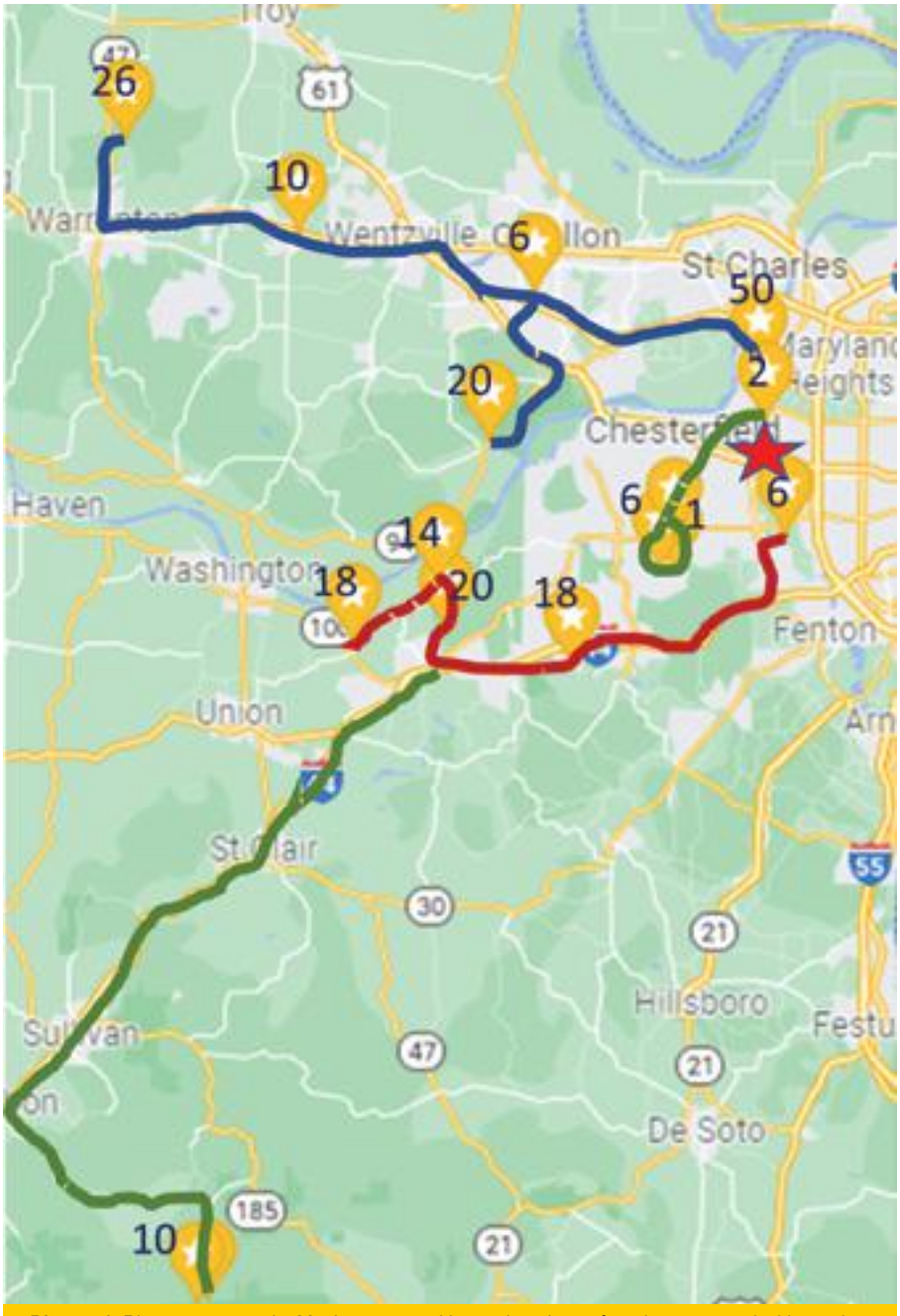
It's been a year and a half since I retired from my day job and started focusing on beekeeping full time. I have since bought a bee truck, built a honey house and done many splits to expand my operation. I was talked into writing these articles, to help other beekeepers who were thinking about doing the same thing. These were never meant to be "how to" articles, but rather "learn from my experience".

In general, I've gotten a lot better. There is a big difference dealing with 200 hives than dealing with 80 hives. I imagine people with 500 hives say the same thing compared to 200. It's about efficiency and planning. So, what have I learned?

Have a plan:

I heard a seminar by John Miller where he said, "know what you are going to do and know what you are not going to do". This is good advice and much more profound than it sounds. For example, I have always built my own hive equipment. I have a friend who repurposes crate lumber and I can build deep boxes for $5.00 each. That works well when you need to build 30-50 or fewer. But when you want to double in size from 100 to 200+, that's a lot of equipment to build. The workload from that expansion also increases, but the hours in a day stay constant. Think carefully, where do you want to spend your time? For the first time, I ordered deep and medium boxes AND ordered assembled frames. Due to the timing, the time it saved me was well worth the cost.

A corollary to this lesson, what is your business model? I decided to be a stationary beekeeper. No pollinating and no chasing nectar flows in neighboring states. I sell nucs, local honey and raise queens to supply my own colonies. Sounds easy enough. Until I took too many orders for overwintered and Spring nucs and had a larger than expected Winter kill. Hmmm, all of a sudden, I didn't have the production hives that I wanted and ended up producing 20% less honey than I wanted to. It took some thought and some calls to some commercial beekeeper friends of mine for me to come up with a strategy. First, don't mess with the production hives. Instead, make a lot of timely, Summer splits in a way that doesn't impact honey production (but, not enough equipment…). Those splits are dedicated to my nuc business and replacing colonies that don't survive. But this is just an example. Everything you do with your bees impacts your operation. What's your focus and what's secondary. You will, ultimately, need to choose.



Picture 1. Plan your outyards. My three outyard loops: locations of yards are starred with number of hives in each listed. The green loop represents my hobby years with relatively few hives and a lot of travel time. The red line is my start into "serious" beekeeping. The blue line is my latest loop.

Picture 2. How nice to collect a route of honey in one shot. My bee truck has greatly increased my efficiency by allowing me to make single trips to my outyards.

Plan your outyards. When beekeepers first start to expand, usually they aren't choosy about where their bees go. A friend has some property an hour away, so they put a couple hives out there. Now, expand to twenty yards. The amount of time wasted in the vehicle, let alone the gas burned is incredible. So think about this up front. I also have criteria for new yards. I need easy access (not the case in my "hobby" loop), I want at least 10 hives with no potential neighbor issues, and it must be within 15 minutes of one of my loops (without going farther).

I now have three loops of yards (see picture 1). The northwestern loop (blue) consists of four yards and 120+ colonies, the southwestern loop (red) of four yards and 70+ colonies and the local loop (green) consisting of four yards and 26 colonies. It's now time for me to "edit" these loops by asking if the time is worth the harvest? Most yards averaged two supers per hive. One, however averaged three and one averaged 0.5. I will put more hives on one and delete the other. By evaluating the health and harvest at each yard, you can adjust the size and improve your efficiency.

Have the right equipment:

The more hives you get, the more efficient you need to be. Having the right equipment greatly improves efficiency. In the name of efficiency, you want to make one trip per day to your home base. That means you carry everything you need for the day to your yards and return when all the work is done. Every time I need to return to get more equipment/supplies, it's a waste of hours. For me, getting a bee truck was phenomenal (see picture 2). Just being able to collect all my honey supers for one loop in one trip was worth it. I also can carry totes of sugar syrup for feeding, scores of boxes and other equipment for splitting and a myriad of other things. I don't drive the truck every time I go to the bees, but when I need it, it's invaluable. I also put on a lift gate, which allows me to load things and move them on pallets, greatly minimizing the number of times I need to lift what I'm moving. In addition to bee equipment, I can now buy pallets of sugar, loads of lumber and other things too big for a pickup truck.

But, along with all the pros to having a bee truck, there is also a learning curve. On one honey getting trip, I had two load shifts. In fact, there used to be four deep boxes of honey in the empty column seen in picture 2. They came off on a turn in the highway. Fortunately, on the side of the road and there was no traffic incidents associated with it. Needless to say, drive and load carefully. Also, loads are higher than on a pickup truck. Both of my brand new garage doors on my brand new honey house are dented due to me not accounting for that.

Design your honey house correctly:

I've already written about my honey house plans. Now that it is functional and I've been through extractions, there are learnings there as well. First, make the walls, and garage doors, as TALL as you can. Because if you have a flatbed and you have it loaded up with stuff, eight feet is just a little too short (and doors get dented). I have 10 feet walls and eight-foot-high garage doors. I wish the doors were two feet higher.

For space needs, plan for the busiest time of the year and build as big as you can. Even if you have a lot of empty space during most of the year, you will be happy for the space during extractions. Picture 3 (next page) shows my building towards the end of my extracting. I had five pallets of supers, some pallets of empties, my extractor and decapping tank, buckets of honey AND I need room for the pallet jack to maneuver. Now add some pallets of sugar, bottles and other equipment and I am at capacity. Far sooner than I expected. You can never have enough shelving. I need space for bottles, a space for clean bottles, a space for filled bottles, a space for lids, a space for buckets of honey, a space for tools, a space for mite treatments and the list goes on. This is beyond the open floor space where you put extra boxes, feeders and supers. Another gem from John Miller, "plan for your first expansion while you are building it."

Spend the money on the right equipment. The less you have to lift, the longer you can be in the business (i.e. healthy back). I have a pallet jack, dolly and hydraulic cart. All of which help me move things with minimum lifting.

On the electric front. Many circuits, many outlets. Make sure to have overhead outlets. It was wonderful extracting and never stepping on a cord and being able to hose down the floor without worrying about getting the cord wet. I put in a refrigerator, which is necessary for cold drinks and lunches. I also have a stove and microwave.

HVAC. I air conditioned the bottling room (16 x 16 kitchen) and I am very glad I did. Missouri Summers are hot and humid and being inside a tin box can get very uncomfortable. Even when not bottling, the bottling room can be refuge from the heat. That being said, a large exhaust fan

moves a lot of air in the extracting room. That and two floor fans do a good job in making the room bearable. But, make sure you put a screen around the inside of the exhaust fan. The number of bees that fly into it is amazing. I learned the hard way to make sure your windows are big enough to take an air conditioner. I got 24-inch windows, figuring I just needed them for light. I went to put in an air conditioner to cool things off while extracting and it didn't fit. Learn from my mistake.

Plumbing. Having an epoxy floor and floor drains make cleaning up a snap. I have both cold and hot water hoses in the extraction room. Hose everything down, squeegee it into the floor drain, then mop it up. The biggest hassle with this is storing the hoses. The slop sink in the extraction room is also a must. I am always covered in honey, now I can wash it off before spreading it all over the place. I also have a bathroom with shower and washer/dryer. I don't regret any of them. I use the washer/dryer to wash both cleaning rags and my bee suits. It makes the honey house a self-sustaining unit and doesn't require me to bring anything home.

Picture 3. You can never have enough space. Plan for your busiest time of year and account for the ability to maneuver the pallet jack.

Find your work-life balance.

We are in this business because we love it. We are building a business because we want to. That situation makes it very tempting to spend all waking hours on your bees and business. Be very cognizant of what you are sacrificing when you go overboard on this endeavor. Your family needs you to be around. You need to maintain your network of friends. Beekeeping is, typically, a solo venture. Where will you get your social interaction? Maintain your piece of mind. It's great when your hobby can become your career. But if you burn out, you lost both.

40K Bees Swarmed Lions Club Meeting

Mark Price

What was in the box? Businessmen looked curiously at the large wooden container as they took their seats for the Akron Lions Club meeting.

Soon they were buzzing with excitement.

More than 75 members attended the luncheon 100 years ago at the YWCA at 22 S. High St., a site occupied today by the downtown parking deck for Akron-Summit County Public Library. Founded a year earlier under the principle of "unselfish service to others," the Akron club welcomed guest speakers each week.

They would not soon forget the lecture of Nov. 15, 1921.

Inventor, author and chemist Huber H. Root, 38, served as general manager of the A.I. Root Co., which his father, Amos, had founded in Medina in 1869. A national expert on bees, H.H. Root had served as an editor and contributor to such publications as *Gleanings in Bee Culture*, *Alexander's Writings on Practical Bee Culture* and *The ABC and XYZ of Bee Culture*.

He presented lectures across the country and spoke of honey bees with great fervor.

"Bees were not created to make honey," he told audiences. "They were created to cross-pollinate flowers. The honey making is merely a useful side industry.

Bees do not get honey from the flowers. What they get from the flower is a cane syrup. Through their bodies, this is converted into grape sugar in a mysterious little laboratory that nobody understands.

When a bee is hungry it opens up a little valve from this laboratory into its stomach. When its stomach is full, it shuts off the valve."

The Akron Lions listened to Root's presentation with interest. They had all but forgotten about the wooden container until Root motioned to it.

"Now, in this box, I have a beehive and a full swarm of bees," Root said. "They won't sting me, of course. But I cannot say what they might do to you."

Club members laughed.

"You're joking. Can't be any bees in that box," said Dow Harter, founding president, U.S. commissioner and future U.S. congressman.

"We'll see whether I'm joking," Root said as he undid the latch and lifted the lid.

An undulating mass of yellow and black teemed inside. As Root pointed out the combs laden with insects and honey, about 40,000 bees were turned loose on the small assembly hall. Pandemonium swept the room as the Lions ducked under tables and covered their heads with tablecloths and napkins.

"Consternation occurred among the club members as the thousands of bees swarmed about them alighting in their hair, on their faces, hands and their clothing," the Akron Evening Times reported.

"Some, who forgot the admonition of Mr. Root not to slap the bees, and tried to shoo them away, were heard to cry out lustily. A few timid ones, who attempted to make for the door when the insects were released, were deterred by the shouts of their brother members."

The sound of Root's muffled laughter cut through the buzzing. When the Lions finally dared to look up, they were amazed to see that Root was covered in bees.

He carefully shook off the insects, put them back in the hive and fastened the lid.

"A bee can't sting unless he sits down," Root said. "And my bees are all trained to stand up."

The Lions chuckled as they returned to their seats, amazed by the startling demonstration.

While the Beacon Journal reported that no club members had been stung, the Evening Times mentioned a "few casualties," but noted that there wouldn't be "many downtown businessmen who will go home to their wives this evening nursing a swollen jaw, eye or something else."

Explaining the inner workings of a hive, Root said the bee colony "is the only real social colony in the world."

According to A.I. Root Co. Executive Huber H. Root: this un-retouched picture of the head of an Italian honey bee was taken to show the particles of pollen in the hair, thus dramatizing the bees' contribution to horticulture.
Beacon Journal File Photo

"Nobody gives orders in a bee community," Root said. "There is no division of labor. If a bee sees there is work to be done, it goes and does it."

Contrary to popular belief, he said, the queen is not the ruler of the colony but is subservient to the wish of the workers who exert total control.

The workers are not neuters but immature females, he said, and queens are mature females. The queen's job is to lay eggs. If the workers want more eggs, they feed the queen more, Root said. If the workers want fewer eggs, they feed her less.

A queen will lay two and a half times her weight in eggs every 24 hours, Root noted. She eats two and a half times her weight every day. And there can only be one. Two queens will fight to the death.

"The drones have been maligned a great deal for being lazy," he said. "That is unjust. Nature has not equipped the drones with tongues and stings so that they can work. When there is plenty of honey, the drones are tolerated. When the food supply runs low, the drones are thrown out to starve."

The Lions probably learned more about bees that day than they ever expected. The incident made national headlines.

Bee allergies must not have been a common concern 100 years ago, because Root pulled the same stunt at lectures across Ohio. Several months later, he gave a talk at West High School in Akron.

"What sort of institution do you think this would be if every individual thought only of bettering the high school?" Root told students. "Suppose nobody thought anything of self-advancement. Suppose a school where the community spirit was 100 percent."

Students shouted and shrieked as Root opened the hive and let 40,000 bees loose. He told the children not to panic.

"Bees don't like nervous people, but it is hard to get them to sting in self-defense," Root said. "They reserve their stings for the defense of the hive."

The bees returned to the box. No stings were reported.

Root repeated the stunt that week at Central, North and South high schools.

We live in a different world than a century ago. Try to imagine school officials allowing such a demonstration today.

H.H. Root went on to serve as president and chairman of the A.I. Root Co. Board. He introduced rolled beeswax candles, which were more resistant to heat, and invented a glass-encased sanctuary light that kept wax from dripping in churches.

He also wrote the 1951 textbook *Beeswax, Its Properties, Testing, Production and Applications.*

Root was 88 years old when he died in 1972.

The A.I. Root Co. celebrated its 150th anniversary in 2019. The fifth-generation, family-owned business, which continues to call Medina home, produces about 20 million candles a year and touts its products as "The Best Candles in America."

The company has been generating a buzz since 1869.

But don't worry: It no longer releases 40,000 bees at public meetings.

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National bee expert Huber H. Root called bees "the only real social colony in the world."
Beacon Journal File Photo

Photo of Huber H. Root

in 1921

Minding Your Bees And Cues

Honey Time: Part 2

Becky Masterman & Bridget Mendel

Extracting scientific information about a good honey crop is a *super* great way to wrap up your bee season. There's much to comb through, from flowering plants, to apiary location, to weather, climate change and of course, bees.

New beekeepers may plan on sustaining their bees with their backyard plantings, but, upon first observing those foragers emerge from the hive entrance and zip up and out over the tree line, it becomes clear that a bigger radius is indeed traversed (approximately two to three miles; further if necessary).

While honey bees prefer to stay closer to home, their success at honey production is due to their ability to locate and recruit their sisters to what's flowering on any given day. Couvillon et al. (2014) recorded and interpreted forager waggle dances (aka recruitment communication to fellow foragers) and reported that foraging distances increased in Summer months in the UK. They concluded that increased foraging distances meant more local, convenience-food was scarce. These data reflect specific apiary locations and we would expect that based on local resource availability (like planting bee pastures full of season-long nectar and pollen producing flowers close to your apiaries), the distances honey bees travel for food could change. So, if you want to keep your bees closer to home and save them some effort, figure out a way to plant more flowers within a two mile radius of your apiaries.

Timing is everything when it comes to honey production and knowing what is about to flower is key to good management. The University of Minnesota Bee Lab's Dr. Marla Spivak thinks that the best beekeepers are also good botanists. She described how they watch the plants for growth and anticipate blooms, getting their supers on before nectar flows. Knowing the timing of the different flowering plants and trees in your area is understanding their phenology. Plant phenology is the timing of a plant's life history, including nectar production, and it is influenced by sunlight, water, soil and plant health. You might be lucky if you have a bee club that records the phenology of bee plants in your area. If not, think about crowdsourcing the information with beekeepers in your area.

Creating bee pastures within two miles of your apiaries contribute to increased honey production and bee health. This field of buckwheat was planted for the University of Minnesota Bee Lab by the UMN Landcare team. **Photo Credit:** Rebecca Masterman

To forage, bees need the right conditions, including sunlight and temperature. Unlike in Camelot, in most places rain also falls during the day and will keep your bees at home. Luckily, your bees have a plan for precipitation events. Using Radio Frequency Identification (RFID) technology, a research team in China reported not only that honey bees' foraging was impacted by humidity, precipitation, temperature and barometric pressure, but there was a significant increase in foraging before a rainy day (He et al., 2016).

Beekeepers worry about their bees in normal weather conditions, but emerging climate change data adds a new layer of concern. Plant phenology can be disrupted by climate change and although increases in temperatures can increase nectar production in some plants, temperature increases along with water stress can also have negative effects on important nectar producing plants (Takkis et al., 2015). Researchers in Chile published a detailed study in collaboration with beekeepers and reported honey production declines over the last decade (Gajardo-Rojas et al., 2022). They also shared that they combated the production decline by planting native plant species and increasing migration of their bees between floral sources.

Flowers, weather and climate change aside, if you do not have a strong, healthy population of bees living in your hives, you won't have thousands of nectar gatherers at the ready to visit flowers. We understand that bee health is impacted by pests, diseases and pesticides. Canadian researchers reported on the potential negative honey crop impact on colonies infested with *Varroa destructor* (Emsen et al., 2014) with an average of approximately 20 lbs less honey produced per hive in highly infested colonies. On a brighter note, researchers in Australia, prior to the arrival of *Varroa*, examined the im-

Strong, healthy colony populations are essential to great honey production.
Photo Credit: Rebecca Masterman

pact of miticide treatment on foraging (Colin et al., 2021). They applied either thymol or tau-fluvalinate in late Fall (Spring in North America) and asked if the application of the chemicals impacted food storage or colony populations. They did not report any significant impacts as a result of the application of the treatments.

Aside from the obvious deadly impacts of pesticide exposure to colony populations, non-lethal consequences can also decrease honey production in colonies. A recent publication reported that foraging behaviors were decreased after a nonlethal exposure to a neonicotinoid (Ohlinger et al., 2022). Although recruitment behaviors (waggle dancing) decreased, the differences were not significant when compared to controls.

Abundant, clean, nectar producing flowers, healthy bees and great weather (for the plants and the bees) all play a part in honey production. While many beekeepers plant their bees down in a site and hope for the best, the honey bee champions are beekeepers who ensure that their bees are healthy and are working to coordinate with willing landowners to install bee pastures close to their apiaries. Here's to this season's honey, and here's to more next time!

Acknowledgment

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Becky Masterman led the UMN Bee Squad from 2013-2019. Bridget Mendel joined the Bee Squad in 2013 and has led the program since 2020. Photos of Becky (left) and Bridget (right) looking for their respective hives. If you would like to contact the authors with your own honey production success stories or other thoughts, please send an email to mindingyourbeesandcues@gmail.com

The Beekeeper and the Big Bad Monk

Stephen Bishop

Once upon a time, a young downtrodden beekeeper, Fred, slogged up a mountain to visit a beekeeping monk. He was the wisest monk in the land, or at least that's what the billboard on the mountain path implied: "IN A FUNK, COME SEE THE MONK—WISEST MONK IN FAIRYTALE LAND!" read the billboard. But the snappy advertising did little to perk up poor Fred. Sadly, Fred felt even more depressed as the path snaked through a forest filled with gnarly old sourwood trees—each tree a reminder of his terrible predicament.

"To beekeep or not to beekeep. That is the question," Fred thought to himself. Alas, his sweet loving wife, who once encouraged his beekeeping hobby, had recently reversed course and rendered an ultimatum: Either he quits beekeeping for a new hobby that doesn't involve extracting honey in her newly remodeled cottage kitchen or she quits him and finds a new soulmate. Thus, Fred journeyed to seek wise Brother Yart, a portly old monk whose depth of wisdom was rivaled only by his breadth of waistline. In fact, hood up, in brown monkish attire, Brother Yart resembled a large woodland creature, namely a bear. Which is why Fred shouted "Ye gads, a bear!" upon finally reaching the anchorage and glancing over at the apiary in the backyard.

"Good lord, you nearly scared me to death, sneaking up behind me like that!" said the bear. Of course, a talking bear in Fairytale Land isn't too far-fetched, but in this case it was no bear, just Brother Yart, who looked like a bear and was working his bees. He was surprised to turn around and see Fred staring at him.

"You nearly scared *me* to death," replied Fred. "I thought you were a…"

"…bear—yeah I get that a lot." said Brother Yart. "What can I do you for? Beekeeping advice, spiritual advice or bulk purchase of sourwood mead? Got a special bundle price this week if you're interested in all three."

"Wait, you have to pay for advice?" asked Fred.

"Sure, how do you think I keep up this plush little anchorage. Beekeeping ain't gonna pay the bills alone."

"Wait, are you sure you're the wise old monk that everybody talks about?"

"Yep, that's me, Brother Yart, wisest monk in Fairytale Land."

Reluctantly, Fred purchased the beekeeping advice. But Brother Yart, upon hearing Fred's dilemma, required Fred to buy spiritual advice as well. "Yep," he said, "anything dealing with soulmates is the spiritual realm." To Brother Yart's credit, he gave Fred a thorough advisory session, counseling Fred on life priorities and saying such wise things as, "Son, it's better to be loved by one woman than to keep the company of many bees, plus divorce lawyers in Fairytale Land are pretty pricey. Last year, Snow White divorced Prince Charming and by the time the lawyers took their cut, Prince Charming was living in his horse-drawn carriage."

Indeed, the consultation lasted so long that Fred became quite parched and requested refreshment to quench his thirst. Brother Yart obliged and sold Fred many foaming mugs of sourwood mead, after which Fred, possibly impaired from his libations, said,"Yart, buddy ole pal, you're right, I should donut, ha ha, I said donut, I mean donate my hives to you… then live happily ever after with my wife."

For a large man, Brother Yart could move fast, and he quickly retrieved his standard donation contract from his filing cabinet and got Fred to sign over all his hives, right before the young man stumbled and passed out.

"Stout stuff. Gets 'em every time," chuckled Brother Yart.

Of course, most children think the moral of this fairy tale is to beware of beekeeping gurus because some are sophisticated swindlers. And that would be the moral if the story ended there. But sadly Fred hit his noggin hard after his heavy drinking and thereafter suffered sporadic bouts of amnesia. This explains why, when Fred later saw what appeared to be a bear carrying away one of his hives, he retrieved his shotgun and peppered Brother Yart with birdshot. And this explains why, milliseconds later, Brother Yart dropped the hive on his foot and was instantly enveloped in a cloud of angry bees.

So the true moral of this fairy tale is, "Karma stings."

Stephen Bishop keeps bees in Shelby, NC. For the record, his wife has not rendered an ultimatum, although honey extraction is now forbidden in his kitchen. You can sign up for his weekly blog post at ***misfitfarmer.com*** *or follow him on Twitter @TheMisfitFarmer.*

BEE VET

An Interview with a British Bee Vet: Dr. Chris Palgrave

Dr. Tracy Farone

(Preview: In this and the next two BV articles, I will be presenting perspectives on the importance and skill of understanding **coinciding** global and local impacts in the management of agricultural animals, such as honey bees. To accomplish this, I will do some consulting, share what I have learned with you and discuss the meaning of emerging diseases.)

Just about anyone who loves animals and/or wanted to be a veterinarian has read James Herriot books, like *All Creatures Great and Small* and *The Lord God Made Them All.* These books follow the life and adventures of a British veterinarian doing farm calls in the English country side. Recently, I had the good fortune to catch wind of a certain English gentleman, Dr. Chris Palgrave, who sure sounded like the James Herriot version of a veterinarian who happened to also fancy bees. Once l heard of a possible British Bee Vet, I just had to reach out to Dr. Palgrave and get his thoughts on bee medicine and how things go in the UK. Turns out Dr. Palgrave has been both an academic and agricultural veterinarian, who happens to give talks on honey bees, and writes regularly for *BeeCraft*, a British version of *Bee Culture.* Hmmm… Big world, small world, we were soon able to sit down over the wonders of Zoom and discuss things like how to treat EFB, the Amish country side of Pennsylvania, heather honey from the Scottish Highlands, the World concern of African Swine Fever and that many Texans really do wear spurs, boots and cowboy hats. Below is a summary of some of the topics we chatted about.

Dr. Palgrave grew up in the country side of Norfolk in Southern England. He remembered being immersed in a culture of nature, food and farm, always donning boots and milking cows. He noted that the "agricultural land butted up to the nature reserves in the area, which may seem like an uncomfortable juxtaposition between conservation and farming, but it seemed to work." Dr. Palgrave thought he was going to become a farmer but ended up becoming a farm vet. He attended veterinary school at Edinburgh University in Scotland (the University famous for cloning "Dolly" the sheep) and was first introduced to honey bees there. Dr. Palgrave also received a PhD from Edinburgh for his studies in pathology, with research in African Swine fever, which is currently an emerging disease of great concern worldwide. Dr. Palgrave then spent some time in the States, practicing as a large animal veterinarian in my home state of Pennsylvania. In PA, he worked with Amish communities "with the only motorized truck in the valley" but he said he really enjoyed his time serving the community and it reminded him of home in England. Dr. Palgrave then completed a residency at North Carolina State University and returned to the UK to teach and work in the veterinary Universities there including, the University of Edinburgh, the University of Bristol and the University of Surrey near London. It was during his time in Bristol, that he became interested in keeping and learning more about honey bee medicine.

Dr. Palgrave explained that by 2015, the Royal College of Veterinary Surgeons started to get more and more questions about honey bees. This led to a formal letter and call to veterinarians who may have knowledge of honey bees, which resulted in the first meeting of the British Bee Veterinary Association (BBVA). Around the same time, Dr. Palgrave became a beekeeper himself and

Dr. Chris Palgrave with a wooden Layens hive.

did a few interesting things with his honey, "Three Hares Honey," in that the honey per bottle is harvested, extracted and bottled as single hive honey… "Not the most efficient way to collect honey," Dr. Palgrave admitted with a grin. But he explained that it was an enjoyable conversation starter in "connecting people with food and place and origin".

England and Wales have a National Bee Unit (NBU) that is made up of full and part time honey bee inspectors that inspect hives, monitor sentinel hives in ports and other high-risk locations and help beekeepers prevent and manage diseases, much like apiary inspectors in the U.S. These individuals are trained bee scientists and keepers, but not veterinarians. (Scotland has its own bee inspection service, headed by a veterinarian.)

Dr. Palgrave shed some light on the history of the formation of the NBU in the 1940's with WWII and sugar rationing. Beekeepers, of course, wanted sugar to feed their bees and were allowed an extra al-

A view of the Exe Valley near Dr. Palgrave's home in England.

lowance but, as one can imagine, this led to a massive increase in backyard "beekeepers". However, inexperienced beekeepers also led to a massive outbreak of AFB. Therefore, the government created the NBU to police the sugar situation and the extra beekeepers to get the AFB outbreak under control. Dr. Palgrave explained that today AFB is not a large concern for British beekeepers, but EFB is more of a persistent problem. Any hives with AFB are quickly destroyed in the UK.

Antibiotics, however, are banned in the UK, so there is currently no legally mandated role for veterinarians to play with honey bee medicine, with one possible exception. Health certificates for honey bees to be exported from the UK require a veterinary signature (unlike the U.S.). Dr. Palgrave's understanding is that veterinarians can work with the NBU on any health certificates that may need to be issued.

Dr. Palgrave went on to explain what he feels are the main challenges in the UK for veterinarians wanting to work with honey bees. "We know we can bring a lot to the table as veterinarians, but how are we to best serve the beekeeping community without a perceived need because 'honey bee medicine' is already being done by someone else. I think part of the solution lies in recognizing that as veterinarians we are experts in animal husbandry, science, health, welfare and production. We also perform the role of trusted friend, counselor and confidant! We have much to offer beyond what people may think of as 'medicine' and can

Dr. Palgrave and son collecting a swarm from a compost bin.

Dr. Palgrave is an agricultural veterinarian and has done important research on Swine Fever in hogs.

work very effectively alongside our colleagues in the bee inspectorate."

"Traditionally, veterinarians don't know a lot about bees." But Dr. Palgrave noted strides in veterinary continuing education, including through the BBVA, and the increasing recognition of honey bees as agricultural animals. "People are asking more (vets) about bees, there is a slow process of recognition that some of us are doing bee things," Dr. Palgrave noted.

As in the U.S., Dr. Palgrave rates *Varroa* and its viruses as a top honey bee medical concern in the UK. Recognizing local adaptability and seeking *Varroa* resistant queens may be part of the solution for managing *Varroa* and improving the health of colonies more broadly. He also believes EFB, CBPV and possible invasive pests (like small hive beetles and Asian hornets) are among the top medical challenges facing British bees.

Most of the 30,000ish beekeepers in UK are hobbyists with only 450-500 commercial beekeeping operations and little migratory beekeeping compared to the U.S. While the challenges of commercial migratory beekeeping are largely absent from the UK, Dr. Palgrave explained that the keeping of bees in the UK has been done in a similar manner for many years. Many beekeepers' measure of success is largely judged by how much honey each hive can produce; they work their bees hard and utilize basic hives, a throwback to timber shortages in the war. However, Dr. Palgrave wonders if "bees have been left behind" in advances we have made in the recognition of the welfare needs and treatment of other agricultural animals. Particularly for backyard hobbyists, other indicators like survivability may be better measures of a beekeeping operations' success. Veterinarians may play a role in promoting increases in animal welfare and health by evaluating operational protocol that may improve long term sustainability for the bees and beekeeper alike. He also believes veterinarians and beekeepers have a responsibility to consider the wider implications of beekeeping activities on the local environment and wildlife populations.

Comb honey made from heather.

Dr. Palgrave's single hive origin honey, Three Hares Honey. Each jar is a bit different.

Dr. Palgrave shared some of his thoughts on how veterinarians can better establish relationships with beekeepers, "We need to start with education of the veterinarians. More bee yards at universities and more bees in the veterinary school curriculum to upskill the vets. Vets hold a certain position in peoples' hearts and in society as being trusted as part of the family and we can develop that for bees, but first we need to establish credibility through education."

Dr. Palgrave believes a three-pronged approach, utilizing government, clinical and academic circles could help establish true working relationships within the industry. "Getting Chief Veterinary Officers (in government) speaking about bees along with chickens, hogs and cattle. Veterinary practitioners could advertise their interest in bees to current clients. Veterinarians in research could adapt existing tools and methodology developed for other animals to the study of bees, without reinventing the wheel." Dr. Palgrave admitted that he is "a little jealous" of the situation in France, the U.S. and other countries, where he believes there has been considerable progress in developing veterinary beekeeper relationships. "(In Britain) We're still working hard to raise awareness within the profession and develop our relationship with the beekeeping community, but it's inspiring to see how much has been achieved in North America in a relatively short period of time."

Believe Me Because I Learned the Hard Way

Ettamarie Peterson with
Cartoons by Lela Dowling

Smart people learn from their mistakes. We all know that, for sure. Beekeepers are usually smart and make their share of mistakes. I am speaking from experience! It is amazing I have survived almost thirty years after thinking of all the dumb things I did. Come to think of it, just today I did another dumb thing! You would think I would remember that combs that don't have foundation invariably blow out in the extractor. What made me think I could spin those combs that were just wired and not have a giant mess of broken comb to fish out of the tank? Maybe I should put a sign on the machine to remind me to use those combs for cut comb honey! It sells just as fast!

Today's mess in the extracting room reminded me of one of the first lessons I learned about extracting honey. Being a new beekeeper, I had a lot to learn about how bees love free honey. I set up the borrowed extractor in the back porch. Then, I went to a colony that had lots of honey ready to harvest. When I took the box off the hive, I didn't cover it, so of course the bees followed their hard work into my back porch. Standing in there with a bunch of bees flying around was bad enough, but then I got one of my brilliant ideas. I opened the door to let them out! Ha! Ha! All their friends outside came in to join them! What was I thinking? It was a good lesson and I never repeated that mistake. Now when I harvest honey, I keep a large plastic container with a lid in my wagon. I pull each honey frame out one at a time and pop it into the container after making sure it has no bees on it. Then I put the lid on before taking the next frame and repeating the procedure. This way I never have to lift a honey super either because I can drag the wagon into my extraction area. I then work with each frame directly from the plastic container.

Another honey related error I made was because I had no idea that the old queen left with the swarm. I got into beekeeping unexpectedly and had no knowledge of what happens before and after a swarm (To tell the truth, I had no knowledge of anything about bees!). My first colony that swarmed was so strong that I decided of course it was ready to make me a box of honey. Right after the swarm I put a queen excluder on top of the brood box and popped a honey super on top of that. When I went back a couple of weeks later expecting to harvest my first honey, I found a honey super full of drone brood! I went to the next beekeepers' meeting and asked my friends what happened. They were all very polite and refrained from laughing at me. Instead, they explained what probably happened was the new queen hatched out and went up through the excluder being small enough at first. She fattened up and could not get back down so remained a virgin, drone laying queen. Of course, that colony failed because I didn't know about re-queening either.

Using a one-way escape to clear the bees from my honey sounded great. It would have been a good idea if I had scheduled my time better and gone back twenty-four hours later instead of two days. When I finally got back to the honey super, now totally empty, waiting to be taken away it was completely full of ants! No one told me ants can immediately sense unprotected honey. Let me tell you, it is not an easy job getting ants off frames of honey! At least I didn't try what my mother did when the ants got into our sugar when we were little children. She poured the sugar in a large pan and put it in the oven thinking the heat would chase the ants out. How wrong her thinking was that day! All the ants just died in the sugar!

One of the funniest things I did as a new beekeeper was trying to be nice to my first colony. I live on a six-acre farm that has plants around that bloom at different times of the year. As I noticed them blooming, I put the hive on a dolly and proudly, bravely moved the bees closer to the flowers. You can't believe how smart I thought this was! Well, of course, by the end of the Summer the colony had dwindled down to nothing. When I asked the beekeepers at the September meeting why my hive was

empty, one of the old timers joked that maybe they went on vacation and forgot to come back! I had not told them how many times I had moved those poor bees! Why didn't anyone tell me bees have been finding their own flowers for thousands of years? Why didn't I know about the rule that you should not move a colony more than three feet away or less than three miles?

My excitement at capturing my first swarm was a disaster! I was still teaching, and my husband had retired so he saw the swarm land while I was at school. When I drove in, he told me my bees were in the hedge. I was so excited and eager to get them I rushed right up to them to put them in a box. They took exception to this maneuver and decide to sting me several times! I had been told swarms were docile, so I had not even suited up! My lesson this time was don't believe everything people tell you about swarms! I also learned how to use the epipen my doctor had prescribed. That was the only time in all these years I have had to use one as I am no longer sensitive to stings and don't do crazy things around bees.

Speaking of stings, reminds me of the time I had a colony of bees that became very defensive. I could not get close to it without a guard bee or two coming after me. One day they even decided to go after my husband while he was on his tractor a good distance away. I called my good beekeeper mentor and friend Hector Alvarez and told him the problem. He came over ready to help with a super aggressive colony. By this time, it had calmed down and I felt rather foolish having him come to my rescue. He opened the hive and explained my problem. I had let the bees get too crowded and before they swarmed, they were unhappy. Once it swarmed, they changed to better bees. I asked him how he knew it had swarmed. He showed me the queen cells and the new queen. I asked him how he knew it was a new queen and he explained she was running around. He told me virgin queens move quickly and mated queens move slowly. Over the years I have witnessed this behavior.

I learned the hard way how important it is to have a good, sturdy hive stand. Once while in a grocery store, I saw a nice little plastic garden stool that I thought would be just dandy for a beehive. The hive I had in mind was at my mother's one hundred miles away. I went to visit her almost every week so I could see the bees weekly, too. I didn't inspect the hive every week and had no idea how fast it was filling up. One day I got a frantic phone call from my mother who was very upset because the cheap hive stand had collapsed under the weight of a lot of honey. The bees were not happy campers, to say the least! I had to get myself back over to her house and rescue the messy situation. This episode was the epitome of the saying, "Don't be penny wise and pound foolish!"

Another hive stand lesson I learned involved my friend Lela Dowling's hive (Yes, that Lela Dowling that makes the fantastic cartoons. She and I are old bee buddies.). She reminded me she asked me to keep her hive at my farm for a while because she was moving them a short distance and needed them to forget their old location (She was a lot smarter about moving bees than I described earlier.). Being a good friend, I told her she could bring it over and I would put it up the hill where it would be safe. We put her hive on a small table, the kind that has a single center pole on a large base to balance it. We had to agree this probably wasn't the sturdiest hive stand. I made it worse by forgetting to turn the nearby water off one afternoon. The next morning, I found Lela's bees down the hill in mud! I quickly called her because we had a giant mess of muddy bee boxes and upset bees to straighten up. Luckily the bees survived, and she was very forgiving. She allowed how the table was not a good choice and I apologized for washing them down the hill. We are still good friends, even collaborating on this article!

Lela had some beginning beekeeper lessons she learned the hard way, too. She thought she could hide her first beehive from her neighbors by putting the hive in an old gazebo in her backyard. She said, "I truly believed no one would notice one little hive in our backyard amongst all the vegetation, hidden away in a rickety old gazebo. The neighbor behind us heard me out in the yard and asked over the back fence if we had a bee hive in our yard, and I lied and said 'no' (I'm such a bad liar!). But then they told me it had swarmed the previous day. Oops! I apologized and promised to remove it."

One lesson I learned the hard way was that you cannot put an excess of bees in a container to move them even a short distance and expect them to survive, especially in our warmer climate. I stuffed a very large swarm in one of those cardboard swarm catcher boxes. Then I put them in my car and took them to one of my 4-H beekeepers. I almost died of embarrassment when we

opened the box to transfer them into her hive. Ninety-nine percent of those bees were dead! It was a sad lesson for both of us. Fortunately, as soon as I got home that day, I got another swarm call, so I had a quick chance to do a better job giving her a swarm.

The bees have taught me to respect their love of making comb in empty spaces. I bet many beekeepers have had the same or similar experiences. I will forget to fill the boxes completely with frames. Then I go back into my hive box and find a beautiful free-formed comb hanging from the inner cover. Of course, it breaks off and falls into the space when I try to lift the lid. This is especially heart-breaking when it is filled with brood. It is possible to put it in an empty frame with rubber bands, but some brood is always destroyed in this process. If it is a piece of comb with honey, it also can be attached the same way, but it is messy. A friend taught me a neat trick to help feed the chunks of honey comb to the bees. You break them into chunks and put them on barbecue skewers, just like making kabobs. Then you place those in the top feeder where the bees can go up to eat their honey. This trick is also good to use if you have taken a colony of bees out of a wall or any other space and must deal with pieces of honey comb too small to rubber band to empty frames.

Lela Dowling also learned a lesson about smokers that won't cooperate and make smoke when needed. She told me, "I really did leave it in the car while I went into a 7-11 down the street from where I kept my bees after working on the hives and it really did fill the car with smoke. Luckily, there was no chance of setting the car alight, but I did have to really air it out before I could leave." She was fortunate no one called the fire department, too!

When I give advice to other beekeepers, I almost always tell them, "Believe me because I am speaking from experience! You wouldn't believe how many dumb things I have done!" As you can imagine I learned from my friend Lela Dowling's mistakes too!

Note: Lela Dowling and I have been friends ever since meeting at Sonoma County Beekeepers Club (now Association) back in the mid-1990's. She has put me in some of her bee cartoons over the years much to my delight! I was so pleased when she agreed to add her cartoons to illustrate this article.

Autumn Management

David MacFawn

Autumn preparations are frequently deemed the most critical of any season. Beginning in September and continuing through December, Autumn is when preparations are made for colony overwintering. How well your colonies are prepared in Autumn will determine, to a great extent, how productive they are the following Spring.

Table 1. Fall Management

Task	Assume kick out drones around first frost. Time before kicking out drones in Autumn
Split colonies at the latest	4 months, 16 weeks
Requeen at latest	3 months, 12-13 weeks
Combine colonies	3 months, 12-13 weeks
Feed colonies low on honey	2-3 months, 8-12 weeks
Treat for *Varroa* at the lowest brood level	Minus 2-3 weeks after kicking out drones

In South Carolina, a late colony split should be made no later than the first week of August. Using all drawn comb is preferable. Most locations do not have a strong Autumn nectar flow to assist in drawing out comb. If enough drawn comb is not in the hive, there will not be sufficient comb space to store adequate honey/carbohydrate to get the colony through until the Spring nectar flow.

The colony should be requeened no later than September 1 in South Carolina, if the colony does not have a young queen (less than one-year-old), going into Winter. By requeening in August, the new queen has enough time to achieve four to five frames of Winter worker bees (two brood cycles). November and December are typically the lowest brood levels during the year, sometimes even reaching a broodless period. A young queen will also help minimize swarming next Spring and helps reduce queen failure during heavy colony build-up in the months of February and March.

Figure 1. The queen.
(Photo Courtesy: David E. MacFawn)

Feeding and brood assessment should occur from August through September. If the colony does not have enough bees in August, feed the colony sugar syrup to stimulate brood development. Internal feeding should be used to prevent robbing the colony; also, use entrance reducers.

Early in September for South Carolina, if the colony does not have at least 50 to 60 pounds of honey (medium feed chamber and honey stored in the brood chamber), the colony must be fed. Consult your local bee association on how much honey to have on the hive for Winter. In South Carolina, the bees begin to store sugar syrup strategically in the colony from mid-September through October. This results in continuous storage of honey in the colony.

Figure 2. A pollen feeder.
(Photo Courtesy: David E. MacFawn)

However, when it gets colder, usually after October, the bees will stop taking the feed. They will leave sugar syrup in the feeder and no longer store it in the colony.

As the Winter progresses, the bees move vertically through the equipment stack consuming honey until they reach the inner cover. If the bees use all their stored honey, they will huddle under a pail feeder placed on top of an inner cover to access sugar syrup (carbohydrates).

In addition to honey, storage for pollen in the brood chamber, typically two frames (frames two and nine in a fully filled ten-frame brood chamber) will allow the bees to build up from December until around the first of February. This is when the maples bloom in South Carolina, which is usually a good early bloom.

Be aware, in some locations, there are pollen dearth's in the Autumn, which may impact Winter bee development. If enough honey or pollen is not available in the hive, the colony should be fed sugar syrup or pollen/substitute. It takes honey and pollen to raise young bees.

Figure 3. Feeding the hive; often sugar syrup in the south will not freeze in the Winter.
(Photo Courtesy: David E. MacFawn)

Weak colonies are defined as ones that do not have at least brood (four frames in South Carolina), sufficient honey stores and sufficient pollen stores. The old rule of thumb was to combine a weak colony with a strong colony, supposedly resulting in a strong colony. The weak queen was killed, and the colonies were inspected to ensure they were disease-free. Combining two weak colonies was not recommended.

However, this old rule of thumb has been replaced in favor of culling weak colonies in Autumn. This change in approach is based on the *difficulty in detecting diseases and viral infections,* as well as the costs of labor, equipment and feed to sustain a weak colony over Winter. It makes little sense to save a weak colony if

it leads to further illness or compromises other viable colonies. However, with this said, a lot of beekeepers put weak colonies in a nurse yard and hope for the best.

During colder months, assemble new equipment and repair older equipment. Prime and paint new unpainted woodenware with two coats of high-quality paint. Old equipment in need of repair and painting should be swapped out of the field to a location accessible to be worked on in the November and December time frame. It is less expensive to maintain your existing equipment than to purchase, assemble, prime and paint new equipment. New equipment that is procured and assembled may be determined by your colony growth plan and sales and marketing plan. In South Carolina's high humidity, I have found equipment assembled with high-quality waterproof glue and nails and painted with a coat of high-quality primer and at least two coats of good quality paint will last about ten years prior to refurbishment.

Develop a colony growth plan, plus a sales and marketing plan. These plans identify existing equipment and resources and any new equipment that will be required for replacement or growth. Necessary new bee yards for the upcoming season should be secured based on your colony growth plan and sales and marketing plans. Financial analysis numbers should be analyzed to determine if you can cover your costs with the number of colonies and their honey production in an outyard. If pollinating, you need to first analyze expenditures to determine pollination rental rates to ensure a reasonable return. Then pollination contracts and fee structures can be offered to interested parties. For more information refer to my book: **https://outskirtspress.com/BeekeepingTipsandTechniquesfortheSoutheastUnitedStatesBeekeepingFinance**

Varroa mite levels, having been monitored throughout the Summer, should be checked again in August and also in October and November. Refer to Randy Oliver's site: **www.scientificbeekeeping.com/** for more information on what are acceptable levels. In Autumn, the queen will reduce her egg-laying, resulting in an increased number of *Varroa* mites becoming phoretic (on the bees and feeding) or dispersal (*Varroa* on the bees and not feeding) rather than in the brood. This will result in higher mite levels but more accurate mite readings. Treating for *Varroa* mites should be considered based on the mite levels.

Mite levels can be determined using either the sugar roll or alcohol wash methods. Sticky boards are no longer considered reliable for obtaining accurate mite levels as too many factors come into play when assessing various sized colonies at different times of the year. Usually, November and December are the queen's lowest laying time and an excellent time to treat. Chemical treatment decisions should be made with respect to temperatures in your area.

Figure 4. Nice colony going into Winter. (Photo Courtesy: David E. MacFawn)

In South Carolina, the colony will need four to five frames of Winter bees to get it through the Winter until late March or early April. Treating as necessary in August will ensure healthy nurse bees which will help raise healthy Winter bees. Winter bees will start emerging at the end of August to the first part of September. Winter bees have more fat/Vitellogenin in their bodies that enable them to overwinter better. Also, the Winter bees are confined and do not forage as much which aids in their longevity.

If you need to feed in the Winter or Spring, feed continuously until the nectar flow starts. I prefer to use pail feeders inverted over the oval porter bees escape hole in the inner cover. If needed, the bees can huddle under the pail feeder. Other feeders may have an issue where the bees cannot access the syrup when they are clustered in cold weather.

In the Fall, if not done previously during the dearth period, reduce your entrances with an entrance reducer to minimize robbing and yellow jacket problems. Yellow jackets will invade weak colonies and kill them. Also, queen excluders need to come off as they can prevent the queen from moving up with the cluster.

Storing frames is also a concern. There are two factors to consider when storing frames of drawn comb. Brood frames will be affected by wax moths. To store brood frames, place them in a plastic bag and freeze them for several days. The wax moths are after the dark brood section of the comb. Clear white superframes are typically left alone by wax moths. Frames with foundation are rarely affected by wax moths. I stack supers with drawn comb at 90 degrees so that light and cold weather gets to the frames. Wax moth larvae are killed when it gets to freezing temperatures, especially if they are outside of the cluster. A final consideration is extra equipment. Any extra equipment should be removed from the hive due to Small Hive Beetles (SHB), especially if it is a weak colony. This is due to the bees not being able to care for the empty space where SHB can hide. As mentioned earlier, *if it is a weak colony, consider culling.*

Autumn colony management will determine your success the following Spring to a great extent. In much of the southeast, the colonies should be fed to ensure at least 50 to 60 pounds of honey in the combined brood and feed chambers. Weak colonies should be culled and not combined. Colonies should be assessed for *Varroa* and treated if necessary. The colonies should go into Winter with a young vigorous queen. A colony growth plan and sales and marketing plans should be developed to direct your tasks and efforts.

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***Beekeeping Tips and Techniques for the Southeast United States, Beekeeping Finance*, published by Outskirts Press**

***Applied Beekeeping in the United States*, published by Outskirts Press**

***Getting the Best from Your Bees*, published by Outskirts Press**

Medicinal Plants and Natural Remedies

Abbas Edun

BILBERRY

Vaccinium myrtillus is a perennial member of the *Ericaceae* (Heath) family;[1] it is also known to botanists as *V. angulosum*, *V. montanum* and *V. oreophilum*. Some of its common names are Black Whortleberry, European Blueberry and Hurtleberry. In France, it is called Myrtille, and in Germany, Heidelbeere.

A common understory plant, dominant or co-dominant in a variety of coniferous forests in mountainous regions, its distribution is wide, but is restricted mostly by climate. It can be found growing east of the Cascades, extending southward from British Columbia (B.C.) to central Oregon and east to Montana. It is one of the most common plants throughout the Rocky Mountains from B.C. and Alberta to southwestern Colorado, northern New Mexico, Utah and southern Arizona. It also grows in Europe, Siberia and across the whole of northern Asia, the Barbary Coast,[2] western Mongolia and Greenland.

Bilberry is a circumboreal shrub and grows well at high altitudes;[3] it is abundant in damp woods, and on moors, heaths and sandy or rocky soil. Clumps of the plant can cover vast areas; it often carpets the acidic ground below spruce trees in a soft pattern of small, green leaves. It requires a well-drained, very acidic soil, with a pH in the range of 4.5 to six, rich in peat, but free of lime.[4] The plant flourishes in full sun or light shade; however, it bears more fruit in a sunny location. It is hardy to zone three, and it can tolerate strong winds but not maritime exposure.

It is a deciduous plant with angular, green, branched stems that grow from a creeping rootstock and rarely exceeds two feet (60 cm.) in height. The stems are usually puberulent, and its short leathery leaves are ovate to elliptic-lanceolate and slightly dentate;[5] at first they are rosy-colored, then yellowish-green and finally red in Autumn.

The wax-like drooping flowers are single in the axils on pedicels, and the calyx shallowly five lobed. The corolla is entire, pinkish and broadly urn-shaped. The anthers have dorsal awns and apical, pore-bearing tubes; the ovary is inferior. The flowers are hermaphrodite (have both male and female organs) and bloom from April to June;[6] they secrete nectar freely and are relished by honey bees and other insects.

Bilberry contains arbutin, flavonol glycosides, iridoids, terpenes, pectins and organic plant acids. Other active constituents include hydroxycinnamic and hydroxybenzoic acids, tannins, sugars, thiamin, vitamins A, B1 and C. Minerals, especially iron, manganese, phosphorus, zinc, magnesium, potassium and selenium are also found in the plant.

The fruit is a rich source of the bioflavonoid complex antho-cyanosides; they are extremely potent antioxidants that reduce free radical damage, which can destroy cell membranes and allow pathogens to weaken the insides of cells and cause disease.[7] Antho-cyanosides are used internally for (a) speeding up the regeneration of rhodopsin, the purple pigment that is used by the rods in the eye for night vision; (b) pathologically increased capillary permeability, especially in cases of diabetic retinopathy, varicose veins and hemorrhoids; and (c) epithelial regeneration with gastric ulcers. The fresh fruit has a slightly laxative effect upon the body, but when dried it is antibacterial and astringent, and a decoction is commonly used in the treatment of diarrhea.

The leaves contain glucoquinones, which reduce the level of sugar in the blood. And it has been claimed that, although they are not an alternative to conventional treatment, the leaves can be helpful in pre-diabetic conditions. A tea made from the dried ones is strongly astringent and diuretic, and is used as an antiseptic for the urinary tract.

A decoction of the leaves or bark is applied locally in the treatment of ulcers in the mouth and throat. Water distilled from the leaves is an excellent wash for soothing inflamed or sore eyes and for promoting the healing of wounds by the formation of scar tissue.

ASHWAGANDHA

Withania somnifera is a shrub or woody-based herb in the Solanaceae (Nightshade or Potato) family. Its other scientific (Latin) names are *W. microphysalis*, *Physalis somnifera* and *P. flexuosa*. Some of its common names are Winter Cherry, Poisonous Gooseberry and Vitania sonnifero.[8]

In its native India, *W. somnifera* is a *kharif* crop,[9] found mainly in the northwestern region of Madhya Pradesh and also in limited areas of some other states. It grows abundantly in Nepal, Sri Lanka, Pakistan, Afghanistan, Bangladesh, the Mediterranean, the Canary Islands, the Cape of Good Hope and North America.

Ashwagandha is found in open woodlands, at the sides of roads, on disturbed ground and on the banks of rivers; it grows from sea level up to an altitude, in the Himalayas, of about 6,500 feet (2,000 m). During the period of its growth, it requires relatively dry weather. It can tolerate a low temperature of 10°C, but its normal range is between 20 and 38°C. Semi-tropical areas which receive between 500 and 750 mm. of rainfall are suitable for cultivation of the plant, and the development of its root is enhanced by light rain in Autumn or Winter.

As a result of the wide range of its growth, there are considerable morphological variations in terms of local species, including the root, stem, leaf and flower. Nevertheless, this article provides a general description of the plant.

It is a small, woody plant, about three to four feet tall. The roots are long, tuberous, brown, fleshy and aromatic. Branches extend radially in a star pattern from a grayish stem; they are covered with a dense matte of woolly hairs. The deep bluish-green leaves are simple, alternate, petiolate and broadly ovate to oblong; they are two to three inches in length and have wavy, entire margins.

The flowers are small and greenish-yellow, solitary or in four- to six-flowered axillary cymes. The corolla is bell-shaped, greenish-yellow and has five triangular lobes. There are five stamens, and the ovary has an inconspicuous disk at the base; the style is thread-like.

The floral structure favours self-pollination in cultivated plants because of a short stigma covered with anther lobes; this is in contrast to feral plants which have a long, projected stigma inviting cross-pollination by honey bees and other insects.[10]

The fruit is a globose berry, shiny and orange-red when ripe; it is surrounded, and much exceeded by the enlarged ovoid-acuminate calyx.[11] The many seeds are discoid, kidney-shaped and yellow.

Withanolides, major chemical compounds, are a group of naturally occurring steroidal lactones found in the roots and leaves of the plant; they account for its extraordinary medicinal properties.[12] Both in their action and appearance, they bear a resemblance to ginsenosides, the active constituents of Panax ginseng.[13]

Scopoletin is a coumarin compound found in several plants including Ashwagandha.[14] It (a) has bacteriostatic activity against *E. coli*, *Staphylococcus aureus* and *Streptococcus*; (b) has anti-inflammatory activity and can be used to treat bronchial illnesses and asthma; and (c) regulates blood pressure and the hormone serotonin, which helps to reduce anxiety and depression.[15] Some of the other constituents of the plant are alkaloids, beta-sitosterol, chlorogenic acid, choline, flavonoids and tannin.[16]

Ashwagandha has been prized in Ayurvedic medicine for thousands of years as a rasayana,[17] and most of its traditional uses have been validated by modern research.[18] It is more of a sedative than a stimulant, its calming, restorative action helping to relieve exhaustion and stress-related disorders such as arthritis, diabetes, general debility, hypertension, inflammation and tremors.

The plant is a revitalizing one that maintains proper nourishment of the tissues, particularly those of the muscles and bones. It restores the neuro-transmitters and is therefore useful for treating various mental disorders and loss of memory.

W. somnifera supports proper functioning of the adrenals and reproductive system. It (a) is a powerful aphrodisiac and is used as an adaptogen; (b) tones up the blood and improves circulation and absorption of nutrients from the cells; (c) enhances immunity, endurance and anti-peroxidation of the liver, and (d) stimulates thyroid activity, and is a natural nutrient for insomnia.

SWEET FENNEL

Foeniculum vulgare is an aromatic plant that belongs to the Umbelliferae family.[19] It may be a biennial, a perennial or an annual.[20] Also known to botanists as *F. capillaceum*, *F. officinale* and *Anethum foeniculum*, some of its foreign names are Bisbas, Ervadoce, Hinojo, Hui xiang, Saunf and Variyali . In France, it is called Fenouille, and in Germany, Fenchel.

Fennel is said to be indigenous to the Mediterranean region because of its use by the ancient Egyptians, Greeks and Romans. However, it has been widely introduced and naturalized throughout the temperate and tropical regions of the world,[21] and is especially at home on dry soils near the sea coast and on the banks of rivers. It prefers a soil pH of 6.0 to 6.7.

The stem is cylindrical, erect, smooth and has a soft pith. It grows from a solid, spindle-shaped taproot,[22] and may become hollow as the plant ages. At maturity it may be as tall as five feet (1.5 metres).[23] The leaves have a very long petiole and may attain a length of about 16 inches (40 cm). They are alternate, and divided three or four times into very fine segments, with the ultimate ones being flexible and thread-like.

Flowers occur at the ends of branches in large, compound flat-topped umbels.[24] Each umbel may be five inches (12 cm) across and consists of smaller umbellets with 14 to 27 flowers on shorter stems.[25] There are two styles swollen at the base that form a stylopodium.[26]

The fruit is a dry, ridged, two-sided capsule; it splits into halves at maturity, each containing one seed. They

are covered by five longitudinal ridges, and temporarily attached to a very thin axial prolongation. Between the ridges there are furrows; special oil ducts known as vittae are situated under the latter.[27]

Pollination of the flowers is entomophilous; a nectar secreting disc situated at the top of the ovary is the main attraction for the insects. Honey bees are among the most common pollinators.[28] Tasmanian farmers have been growing fennel since the 1980s to produce honey.[29] It is characterized by a golden to reddish colour and has a pleasant aroma.

The Parsley family is rich in secondary metabolites including essential oils.[30] The ripe fruit and seeds of *F. vulgare* usually contain about five percent of such oil with anethol as its principal ingredient.[31]

Fennel is one of the most important medicinal plants because it has been extensively used for a wide range of ailments.[32] It is well-known to those who are familiar with the Ayurveda, Unani and Siddha systems of medicine.[33] The herb has been used as an estrogenic agent for a very long time. Specifically, it has been reputed to increase libido and milk secretion, promote menstruation, facilitate birth and alleviate the symptoms of the male climacteric.[34]

HEMP AGRIMONY

Eupatorium cannabinum is a robust, herbaceous perennial member of the Asteraceae family;[35] it is also known to botanists as *E. ponticum.* Its common names include Gravel Root, Raspberries and Cream, St. John's Herb and Water Maudlin.[36] In France, it is called Eupatoire chanvrine, and in Germany, Wasserdost; the Italian name is Canapa Aquatica.

It is very likely that the vegetational history of *E. cannabinum* commenced in Britain because some cypsela fragments were preserved in ancient deposits in English Interglacial, late Glacial and Neolithic beds.[37] It is now found throughout the northern temperate zone in Europe and Siberia, as far east as western Asia, on the temperate Himalayas, in Japan[38] and northern Africa.

Its floral region in North America is in the states of New York, Pennsylvania, Maryland and Virginia. It thrives between zones five and nine,[39] but it is occasionally found elsewhere as a garden escape. Usually a hygrophyte, *E. cannabinum* is common in bogs, on the banks of rivers, sides of ditches and at the base of cliffs on the seashore.

Erect round stems arise from a woody rhizome, reaching a height, at maturity, of about five feet (1.5 m.). They are reddish in colour, covered with downy hair and are woody below; they have a pleasant aromatic smell when cut. The leaves are lanceolate and palmately divided with sharp-toothed margins.[40] They bear distinct, short hairs, and are sparingly sprinkled with small inconspicuous, resinous dots.

Eupatorium cannabinum is a dioecious plant which grows well in the sun. The flowers are hermaphrodite. Five or six small florets are grouped together into a capitulum which is subtended by two rows of involucral bracts with rounded tips and membranous margins. The capitula are borne in corymbose clusters. The corolla has five short, fused petals, is tubular and covered with scattered resinous points. There are five stamens with the anthers united into a tube around the style. The centre of the flower is occupied by two carpels fused together into a pistil; the style is solitary, the stigma two-lobed.

The scented flowers are pollinated by honey bees and other insects from July to early September. The achenes (fruits) are provided with a pappus, a crown of hairs of a sordid white colour, and are adapted for wind dispersal. The plant overwinters as a hemicryptophyte.[41]

Hemp Agrimony, described in herbals since the 10th century, was employed chiefly as a purifying and detoxifying herb. The plant has a long history of use as a gentle laxative that does not provoke irritation, although excessive doses can cause purging and vomiting. It also stimulates the removal of waste products via the kidneys. It is an herb which promotes digestion, improves the functions of the stomach and assists the flow of bile from the gallbladder into the duodenum. In Holland, it was used by peasants with swollen feet for jaundice.

Research has shown that *E. cannabinum* has been used as an expectorant and a diuretic, and it is said to have anti-cancer properties. It contains polysaccharides which provide immune system and heart health benefits plus the ingredients for DNA protection. It has been used as a remedy against intractable constipation and for decreasing the level of cholesterol.

P-cymene, an aromatic monoterpene and active constituent of the plant, is antiviral. The sesquiterpene lactones[42] are antiseptic, antibacterial, anti-inflammatory, cytostatic and cytotoxic. The herb also contains the flavonoids rutin, hyperoside and quercetin. Root cultures of *E. cannabinum* have been shown to contain many benzofuran derivatives. Psoralen, one such derivative, is used in the treatment of **psoriasis** and vitiligo.

A tincture, given in frequent small doses and well diluted with water, is used to induce sweating and to alleviate fever. A tea, made with boiling water poured on dry leaves is said to give prompt relief if taken hot at the onset of influenza or a bilious catarrh; it is also used for disorders of the liver, spleen and gallbladder.

The plant should only be used under professional supervision because it contains hepatotoxic pyrrolizidine alkaloids which can cause veno-occlusive disease and liver failure.

References

[1] *Vaccinium* is from the Latin "vacca" – a cow, and *myrtillus* means "myrtle-like." The Heath family includes Buck Berry, Cranberry, Crowberry and Huckleberry.

[2] Morocco, Algeria, Tunisia and Libya.

[3] The name Bilberry is derived from the Danish word bollebar which means "dark berry." The circumboreal region is a floristic one, as delineated by some geo-botanists, within the Holarctic Kingdom in Eurasia and North America.

[4] When lime is present, the plant suffers from chlorosis, a yellowing or whitening of normally green tissue because of a decreased amount of chlorophyll, often as a result of disease or nutrient deficiency.

[5] Puberulent: covered with very short fine straight erect hairs.

[6] Unfortunately, *V. myrtillus* produces few of its tiny flowers and therefore often has no fruit. However, when there is fruit, it is a delicious black or blue berry.

[7] Antioxidants are substances that stimulate circulation and help cells in the body to resist and repair any damage.

[8] Winter Cherry is also a common name for *Cardiospermum halicababum* (Balloon Vine), *Physalis alkekengi* (Chinese Lantern), and *Solanum capsicastrum* (False Jerusalem Cherry). The name of *W. somnifera* in Urdu is Samm Al Ferakh.

[9] It is usually harvested in the Autumn (*kharif* in Arabic).

[10] Flowers of each gender may be considered as offering different rewards; females provide nectar and males pollen.

[11] The calyx, consisting of fused sepals, is three to five millimeters. long in the flower, enlarging to 10–28 mm. in the fruit.

[12] Singh, G. et al. 2010. Biological activities of *W. somnifera*. *Annals of Biol. Res*. 1 (3):56-63.

[13] That is why Ashwagandha is known as the Ginseng of India. See Singh, N. and M. Gilca. 2010. Herbal Medicine – Science embraces tradition – a new insight into the ancient Ayurveda. Lambert Academic Publishing, Saarbrücken, Germany.

[14] Cultivated plants are distinct from feral ones in their therapeutic properties but the same alkaloids are present in both of them. Coumarin: a white, crystalline, sweet-smelling compound (C9H6O2) found in many plants, especially tonka beans.

[15] Singh, N. et al. 2011. An Overview on Ashwagandha. *African Journal of Traditional, Complementary and Alternative Medicines* 8(5 Suppl):208-213. Rasayana is an herbal preparation that is used to rejuvenate, restore health and promote longevity and overall physical and emotional well-being.

[16] Uddin, R. et al., 2012. Phytochemical and pharmacological profile of *W. somnifera*: A review. *Journal of Applied Pharmaceutical Science* 170-175.

[17] Bhattacharya, S.K. et al. 2000. Anxiolytic-antidepressant activity of *W. somnifera* glycol-withanolides: an experimental study. *Phytomedicine* 7(6): 463-469.

[18] Winters, M. 2006. Ancient medicine, modern use: *W. somnifera* and its potential role in integrative oncology. *Altern. Med. Rev*. 11(4):269-77.

[19] Smith, K. V. 1978. *The Illustrated Earth Garden Herbal*. Melbourne, Thomas Nelson & Sons Ltd. The family is a large class of fragrant or aromatic plants that have flowers in umbels and include some economically important plants such as Anise, Caraway, Carrot, Dill and Parsley.

[20] Piccaglia, R. and M. Marotti. 2001. Characterization of some Italian types of wild fennel. *J Agric. Food Chem*. 49:239–244.

[21] Aprotosoaie, A.C. et al. 2010. The chemical profile of essential oils obtained from fennel fruits. *Farmacia* 58:46–53.

[22] A large, central and dominant root from which smaller ones sprout laterally. Typically, it is somewhat straight and very thick, tapered towards the end and grows directly downward. It helps the plant to tolerate both drought and wind.

[23] Sundararaj, D. D. et al. 1963. Preliminary observations on Fennel with special reference to floral biology. *Madras Agricultural Journal*. 50:235-238.

[24] Morgan, D. 1981. *Biological Sciences: the Web of Life*. Canberra, Australian Academy of Science. An umbel is a floral arrangement in which the pedicels of the flowers originate from a common point, much like the ribs of an umbrella.

[25] The total inflorescence is made up of a maximum of 30 umbellets.

[26] Stylopodium is a glandular, conical expansion at the bottom of the style in plants belonging to the Umbelliferae family. The word was introduced by the German botanist Georg Franz Hoffmann in 1814.

[27] Pandey, B.P. 2007. *Botany for Degree Students*, page 435. New Delhi, S. Chand & Co.

[28] Chaudhary, O. P. et al. 2002. Foraging behaviour and pollination ecology of honey bees on fennel. *Pcdgs. 6th A.A.A. Intl. Conf.*, Bangalore, India. They obtain both nectar and pollen from the flowers.

[29] Tasmania is an island state of Australia. It is located 240 km to the south of the mainland, and is separated from it by the Bass Strait.

[30] Kubeczka, K. H. 1982. Chemical investigations of essential oils of umbellifers. *Aromatic Plants* 165–173. Springer, Dordrecht.

[31] Anethol, known as anise camphor, is a white, crystalline powder having a sweet taste. Fennel oil also contains small amounts of estragole and fenchone.

[32] The author of the present article has only mentioned a few of its uses.

[33] Rahimi R. et al., 2013. Medicinal properties of Foeniculum vulgare Mill. in traditional Iranian medicine and modern phytotherapy. *Chinese Journal of Integrative Medicine* 19(1):73–79.

[34] Albert-Puleo, M. 1980. Fennel and anise as estrogenic agents. *J. Ethnopharmacol*. 2(4):337-44.

[35] The daisy or sunflower family was formerly known as Compositae.

[36] It is also called Holy Rope as it was thought to have been employed in the crucifixion of Jesus. The "Agio Schinio" or "Agios Cannavos" is said to be the only extant piece of that which the Romans used at the time. It is to be found in the Monastery of the Holy Cross (Timiou Stavrou, in Greek) located in the central square of Omodos village in the Troodis area of Cyprus.

[37] The fruits are called cypselae. They are known to resist oxidation and are highly resistant to decay. Several tufa deposits have yielded many of them. Tufa is a soft, porous calcareous rock formed in springs, waterfalls and lakes in limestone regions. Radiocarbon dating suggests the age of those deposits as being close to the late-Glacial – Holocene transition.

[38] Up to 12,000 feet (3,600 m.), and on the Khasi Hills, part of the Garo-Khasi range in the Indian state of **Meghalaya**, up to 6,500 feet (2,000 m.).

[39] The extent of these is shown in the U.S. Plant Hardiness Zone Map.

[40] Both the common and scientific names of the plant come from the similarity of the leaf pattern to that of the unrelated cannabis (hemp) plant of psychoactive fame.

[41] A plant whose perennating buds are situated at or just below the soil surface during the time of year unfavorable to growth.

[42] The major one is eupatoriopicrin which belongs to the germacranolide class of natural compounds.

Bayou Apiary

Carol Harbo

There is a peaceful glen in the bayou where I witness a talented lady. She isn't apparent as I approach her realm. She doesn't scold or warn or such. Her backdrop is dappled green and soothing; her stage lights, aslant and irregular. She's the tufted titmouse who frequents the yard each year when blood-orange iris bloom in the mucky edges of the bayou.

Few of us visit a glen like this; few are drawn to a yard of honey bee hives. But that's where I work on infrequent occasions. This welcoming Spring morning with its light, cool breeze is one of those days.

Others have recently visited the bee yard. Each has left his sign: deer tracks, fresh armadillo holes, skunk tracks along with a residual odor. An *experienced* skunk was here last night. Shuffle marks on the ground in front of hives say many guard bees met their maker by an accurate swat of the skunk's front paws when they instinctively protected their home. And his uneaten kills lie in front of undisturbed hives.

Suddenly the big-eyed titmouse also notes the skunk's invasion. It'll prove a fortuitous one for her. I catch only a gray shadow flitting past my veil as she lands on a hive lid, peers over the edge and plunges to the ground. She expertly grabs a bee and takes flight. She executes this landing, diving, takeoff,—landing, diving, takeoff—over and over. On each trip a honey bee is served to her insatiable hatchlings.

The Duet

Jim Thompson

I hope that you will like a postcard from my collection entitled *The Duet*. It shows a fairy princess conducting the music made by a bee on a piccolo and a grasshopper on a violin.

Of course we all know that this could never happen in real life, but did you know that Charles Butler, an English minister, logician, grammarist, musicologist and beekeeper that lived from 1560 to 1647 wrote a book called *Feminine Monarchie* in 1609? It was revised in 1623 and 1634. There were several errors that he corrected in beekeeping mentioned in his book. One – Aristotle said that the bees in the hive were led by a "King Bee" and Charles Butler identified the bee as the Queen Bee. Two – Butler observed that damaged bees secrete an alarm pheromone which leads other bees to sting. Three – he observed that bees produce beeswax rather than collecting it from plants. Four – he transcribed bee sounds into musical notes. From the tone pitch of the buzzing bees, one might be able to tell when swarming is going to happen. Another tonal discovery was the difference between piping, quacking or tooting. These scores appear on pages 78 to 81 of his 1623 book and are written for four voices: Meane (soprano), Tenor, Bassus and Countertenor. You will find two of them on one side of the page facing each other and the other two parts on the adjoining page so the four singers could be positioned around the book and see their parts.

I saw once an account of the difficulties that Butler had in adjusting the tone and frequency of the notes, and was unable to find it again. But he found that it was in the key of G minor or C.

When you think of it, honey bees don't have a larynx so they have to make noises by using their thorax and wings causing a vibration which can be heard. Oops, honey bees don't have ears either, so the vibrations are picked up by the fifth segment of their antenna.

When a queen is about ready to emerge from her cell, she makes a noise called piping. A queen that is already in the hive may answer the piping with a sound called quacking or tooting. It is a way for the emerged queen to locate and kill the rival queen while she is in her cell. The beekeeper may look at the queen cells in a hive and tell whether the queen has emerged or was killed. If the queen cell has a trap door open, the queen emerged and if the queen cell has openings along the side of the cell, the queen has been killed.

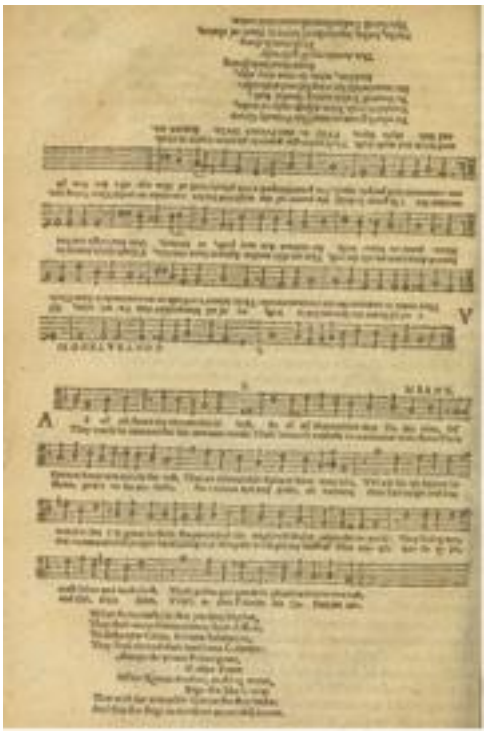
You may be near the hive and hear the noise of the bees planning to swarm. I don't remember hearing that sound, but I remember the old saying that when a swarm is in the air, you can get them to land by beating on a pan. Oh, what advice is given! Run in the house and get a pan and something to beat on it, hurry back outside near the swarm, chase after the swarm while beating the pan like crazy, and guess what? The swarm eventually lands. See it works and you had to only travel two blocks.

Bees must think that you understand them. Have you ever stood in the flight path of a honey bee? The first thing that she does is bump into you and you think "What is wrong with these bees, are they blind?" Your second warning is a bee buzzing right in front of your nose and mouth. Why there? Because she has detected that you are alive and breathing by the carbon dioxide that you are exhaling. Now you should step aside for there isn't a third warning.

Bees communicate with each other by doing such things as a waggle dance and a round dance. These dances tell the other bees where the nectar is in relation to the hive. If you have seen these dances preformed, did you notice the bees close to the dancer are touching her with their antenna?

A study done by Lilach Hadany of Tel Aviv University states that plants hearing the buzzing of the low frequency sound of bees can increase the sugar content of their nectar 12-20%. This increase occurs within three minutes after the buzzing. I wonder if the bee waits until the richer nectar arrives or if it is meant for other bees or creatures. I also didn't know plants could hear, but I know people talk to their plants. However, I wonder if there are any other studies like this one and how long the rich nectar is viable?

There are studies showing that plants feel pain such as cutting and smashing, but since the plants do not have a central nervous system, they react from vibrations.



There are several others that have used music while working with bees such as Dr. C.C. Miller, George York, Dr. Walter Rothenbuler, Dr. Norman Gary and others.

Dr. Charles C. Miller, June 10, 1831-September 4, 1920, taught singing school while going through school. When he was first married, he taught voice and instrumental music before becoming a high school principal. His fingering procedure on the piano was different from the normal practice, but soon was adapted by many. He teamed up with Eugene Secor of Iowa and wrote many bee songs. These songs were compiled and printed by George W. York as a pamphlet *Songs of Beedom*. He had an excellent singing voice and sang at the Marengo Opera House between 1883 and 1914. At the International American Bee Keeping Association, he performed a few of his bee songs including "Dot Happy Bee Man" and "The Bee-Keeper's Reunion Song."

Dr. Walter C. Rothenbuhler, 1920-2002, and Victor C. Thompson, 1920-2012, were known for the genetics of AFB resistance and hygienic behavior of honey bee stock. When they were teaching at Ohio State University they would occasionally play music to their students.

Dr. Norman Gary served on the University of Davis entomology faculty from 1962-1994. Thus he is known as being a professor, bee research scientist, musician and professional bee wrangler. For more than 65 years he performed in many bands playing clarinet, alto sax, tenor sax or flute. The last group, Beez Kneez, disbanded October 17, 2004.

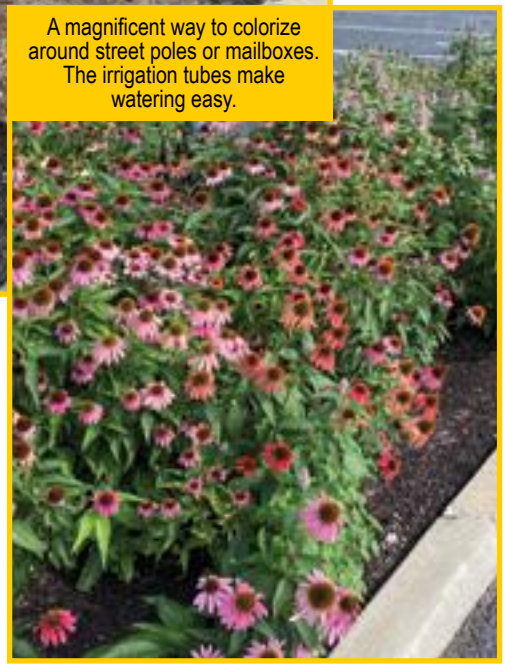
Most of you know a song that has the word bee in the title as I found fifty of them. But did you know that the song "Flight of the Bumble Bee" ended up as a contest of how fast one could play it?

References:

C C Miller - Wikipedia.pdf
Israeli scientists find a flower they say can hear approaching bees
List of 50+ Songs With Bee in the Title...
The 'piping' and 'quacking' of queen bees – Moir Rare Book Collections - Nation

Getting to the Root of Bee Culture

Alyssum Flowers



A magnificent way to colorize around street poles or mailboxes. The irrigation tubes make watering easy.

In Spring of 2020, Brad Root, the 5th generation Owner and President of A. I. Root Company, decided to plant pollinator friendly perennials in front of the 150+ year old office headquarters in Medina, Ohio. True, pollinator plants had been there, but he wanted a more colorful, orderly combination of choices. In the last two years, we have described some of the pollinator plants, but it is time to show how beautiful and appealing it is to many pollinators, as well as visitors and travelers.

These sidewalk plots show that even with minimal space, anyone can provide essential food for pollinators which are attractive and enjoyable for people and easy to maintain. Hopefully these delightful flowers will inspire our readers to plant food for the bees, butterflies, moths and hummingbirds among many other pollinators for next season!

Notice the honey bee working the Allium in these pictures. Many sizes and shades can fit into any garden.

Colorful Echinacea (Coneflowers) are easy to grow and attract a host of butterflies and bees!

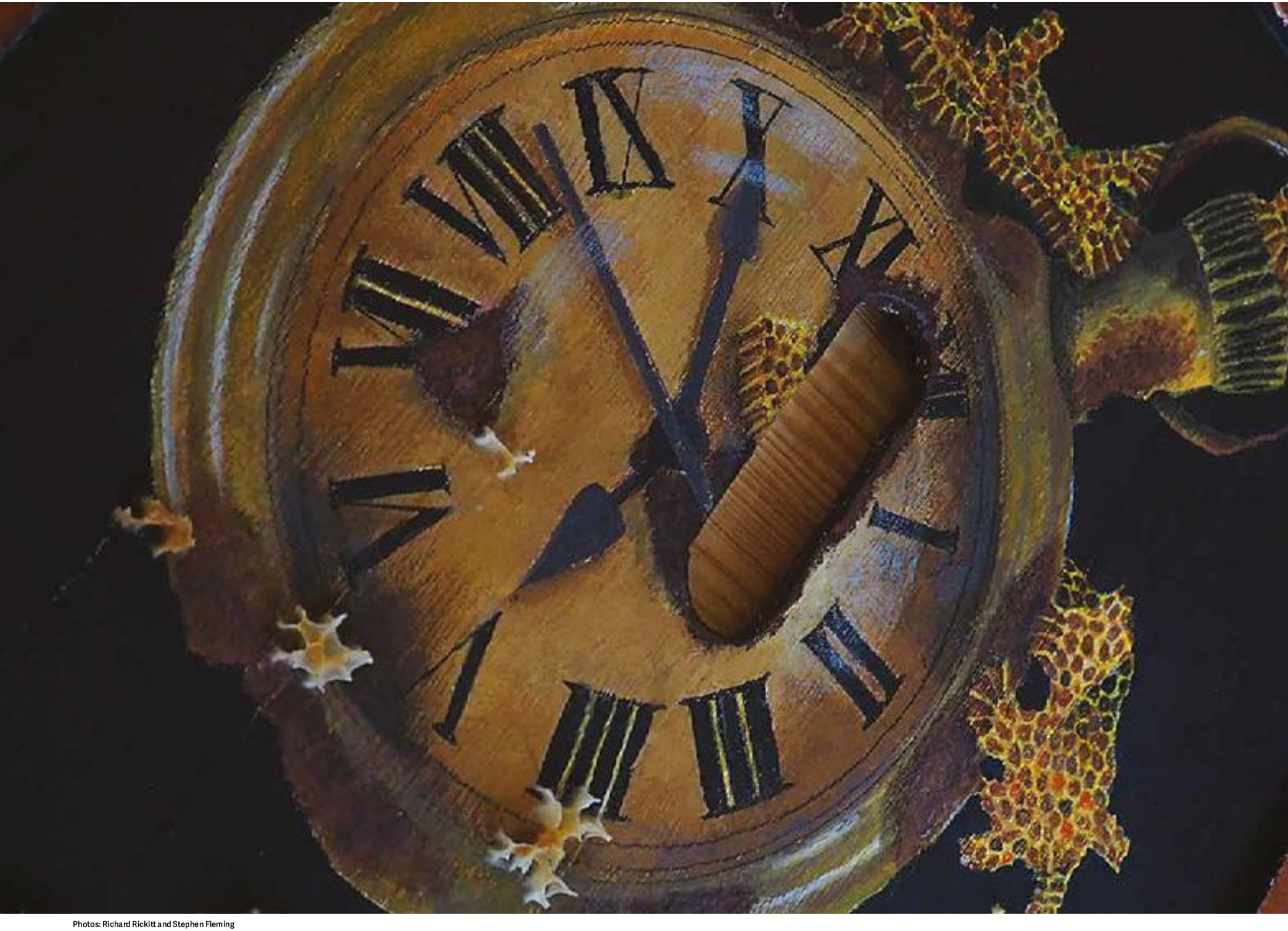
Veronica spp. grows easily and will keep weeds out. Many colors are available.

Buddleia (Butterfly bush) "Lo and Behold Blue Chip," a dwarf variety of a pollinator favorite!

Hydrangeas can brighten shaded areas. Also visited by many butterflies, bees and small pollinators.

Salvia is a favorite for its color choices and season long flowering. It is a favorite of many butterflies and native bees.

Monarda (beebalm) is a favorite of many bees and butterflies as well as hummingbirds! Several colors are available.



Photos: Richard Rickitt and Stephen Fleming

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Art for bees' sake

Stephen Fleming, co-editor

On the edge of the legend-rich Somerset Levels, a young artist is taking inspiration from the creations of honey bees and communicating a contemporary message about their plight.

Jacob Trood has grown up in a family beekeeping tradition, starting with his grandfather, Neil Trood, and his father, Tim, who began beekeeping together four decades ago. Bee motifs abound in the cottage kitchen and the subtle scent of beeswax pervades the atmosphere.

On the wall, time has stopped at exactly four o'clock and virgin beeswax comb hangs down, like the beard of a well-groomed Old Father Time, preventing pendulum movement. Jacob had collected a swarm in the clock cabinet and the bees quickly set up home, only to realise within a day or two that the space was too small and that, like time, they must fly. Fortunately, the absconding swarm hung up in the garden hedge and was promptly rehoused in the family apiary. But not before the bees had spent some time and left their mark in the clock. The clock has stopped and, says Jacob, "We are left with the idea that the bees used everything they knew to try to get it working again but are stuck without the mechanical knowledge of humans."

Time is a recurring theme in Jacob's work. "A time limit can put people under pressure to act," he explains. "Without the pressures of time, we may delay action – the chance to say we don't need to do anything if it won't affect us in our lifetime."

Jacob has worked with various time devices – from an hourglass to a sundial – adapting them to show that time is running out for bees and that human intervention is needed. He is about to begin his third year Fine Art degree course at the University of the West of England in Bristol and, as a young artist, has quickly found a message he wants to convey through his art and broken down traditional barriers between art and science.

Artistic roots

Jacob, now aged 21, first became involved with bees by, in his own words, "getting in the way" of his beekeeping father and grandfather from about the age of 12, with an uncomfortably memorable moment occurring at age 15, when he received stings on each of his knees just before his school exams.

Alongside the beekeeping tradition, artistic talent appears from time to time in the Trood family. Neil, Jacob's 87-year-old grandfather, is artistic and recalls his own great uncle, William Henry Hamilton Trood, who was a renowned Victorian artist specialising in paintings of dogs. "Even at the age three, Jacob showed very early promise," says Neil. "He would draw a house – the usual box shape for a child. Then I would draw a house [with perspective] and even at the age of three, he could understand the difference."

As far as they know, the family beekeeping tradition is four decades old has now entered the third generation. Grandfather, Neil, and father, Tim, had taken up beekeeping together – "in the pre-Sheriff beesuit era," recalls Tim with a rueful grin. They liked to experiment with bees and so Jacob has grown up in a stimulating environment that has prepared him to explore his artistic talents with bees.

Now it seems almost inevitable that Jacob would draw bees. At first their anatomy interested him but, as he researched his subject matter, he began to realise their plight and this gave real meaning to his art, a rich seam that he has mined ever since.

One of his early works was a wall of honey. For three months, 260 half-pound jars of honey were stacked up, five-feet wide and six-feet tall in a wooden frame, in his grandfather's living room. The honey wall, an artwork probably worth £1000 in materials alone, has since been consumed.

One of grandfather Neil's favourite artworks of Jacob is one of his early ones, a wax model of bee with its stripes consisting of differently coloured wax.

At university, Jacob has continued the bee and time theme, not always with the unconditional support of his tutors – beeswax is such a difficult medium to work, they say, although they did concede that the bees could be creative wax artists themselves. The spring lockdown couldn't put a stop to his artistry. In some ways it helped. In contrast to many fellow students, who couldn't access university studio equipment during the lockdown, Jacob's material was at home – at the bottom of his garden. Just beyond the apple trees and the chickens, is the family apiary of ten hives in a pastoral setting. There was even a kitchen Aga stove to help soften and make the wax more pliable. As if that wasn't enough, when it came to the need for specialist wax-casting equipment for individual bees, there was even a dental technician in the village happy to allow his older, now obsolete, equipment to be used to mould bees instead of teeth. The spring sunshine also helped because the bees became active early in the season.

Technical challenges

Ironically, Jacob had his own little run-in with bees and time, and has suffered for his art. When removing the sundial from the hive, he tried to start work too quickly and didn't don his full beesuit. A bee took exception to this interference, stung him, Jacob reacted quite badly and soon an ambulance was on its way. Fortunately, he has recovered fully but he has learned another valuable lesson about time, bees and humans.

Jacob soon discovered that bees will build wax on most items introduced into a hive – and can be vaguely directed by judicious positioning of strips of foundation or wire. When he placed a beeswax cast of a smoker, made with a silicone mould, in a hive, he found that the bees secured the joints. The delicate-looking sundial benefited from the bees' wax buttressing.

Realising that bees are eager to build wax in the spring, Jacob tries to put the objects in hives as soon as the weather allows and, fortunately, spring was early this year – at the end of March and early April in Somerset. By putting 'foreign' items in a brood box above a queen excluder, there is sufficient space, and no eggs or brood will contaminate the finished result. He has also discovered more about bees' habits – how much tougher their drone comb is than worker comb and how much they will recycle and reuse wax within the hive.

Jacob's highly innovative work takes him into new territories and unusual technical challenges. Lost-wax casting of 105 bees was made possible by the dental technician's equipment and took 42 hours of painstaking work to complete. Having collected dead bees from the front of the colonies in spring, he was able to cast them even showing the detail of wings in incredible detail (and inadvertently and unexpectedly showing little sign of deformed wing virus in the home apiary colonies). The end result is displayed on a hand, with the bees closest to the fingertips of the beekeeper's hand alive while others fall, dead and dying, beneath the palm.

Beehive equipment even comes into play through pyrography and painting – Jacob has burnt an image of his father beekeeping onto a piece of oak and painted a clockface onto a coverboard.

Converting a sand hourglass into a honey hourglass was successful, but not first time. Again, the dental technician came to the rescue with a very fine drill that didn't cause the hourglass to explode in the transformation.

A medium, a message and the future

Now that as an artist, Jacob has found his medium and his message, does he think he can make a career from his art? Regretfully, he doesn't think so. Although the work of his grandfather's great uncle fetches a good price today, it didn't do so well during his lifetime. Jacob doesn't relish the thought of being a struggling artist but he does hope his creative talents can be used in the modern economy.

> "A picture of a bee on a flower can sell to almost anyone, but my current work attracts the interest mainly of beekeepers."

Jacob also finds it difficult to price, and therefore sell, his work. He has sold some pieces, but he admits he doesn't like to let go of his art. His work adorns his bedroom and has since spread downstairs into the living room … and the kitchen … and back upstairs into the loft (where, thankfully, it did not succumb to the heat of the summer). He is running out of space, so art lovers may have an opportunity to purchase some soon.

Meantime, you can watch Jacob's progress on social media. He frequently posts on Instagram (@jacobtroodart), and to a lesser degree on Twitter and Facebook (again, @jacobtroodart). Through his global Instagram contacts, he has produced a book, *The World of Beekeeping*, that features his paintings of and interviews with beekeepers from around the world (tinyurl.com/BC2020-10-08).

Let's leave the last word with grandfather Neil, who combines the practicality, thriftiness and science of the beekeeper with an appreciation of art:

"I like to see things done properly. I don't like ship-shod work, especially when lots of precious wax is involved. I'm proud of Jacob's work."

PREVIOUS PAGE FROM LEFT The painted and waxed crownboard clock • The stopped pendulum clock • The honey hourglass

FROM LEFT CLOCKWISE Individual sculpted bees on moulded fingertips • Jacob Trood with his wax smoker and the Somerset Levels in the background • Wax sundial • 105 bees • Bees' creative artwork on the smoker base

Talents and Skills

Jeremy Barnes

The difference between a talent and a skill is significant. The former, according to the Merriam-Webster dictionary, is 'the natural endowments of a person, a general intelligence or mental power, a special aptitude' and is derived from the ancient Greek, *talanton,* meaning the pan on a scale, which in Latin became *talentum,* a unit of weight or money. The implication is that a medieval Englishman saw a talent as one side of a balance, the latter acting as a metaphor for what we bring with us into this world.

A skill, on the other hand, is defined as a learned power of doing something competently, a developed aptitude or ability, and is derived from the Old Norse *skil,* meaning distinction.

Thus we are born with certain talents, or what Howard Gardiner has called multiple intelligences, presumably genetic. Mostly, we take them for granted – we are unconsciously talented – and one of the joys of parenthood is watching those talents, or gifts, emerge in one's children. Skills, by comparison, develop as we grow, either through personal endeavor or coaching. My supposition is that it is easier to develop a skill that is related to one's talents.

As a personal example, I realize that I have a talent for experiencing the natural world and for writing (as a means of getting my thoughts in order) and with the benefit of hindsight, I can see how both played a significant part in my education. My mother recognized my joy of writing and provided both feedback and encouragement, nor did my parents discourage the long hours I spent alone in the Rhodesian bush despite the risks, an attitude that is difficult to imagine in an age of helicopter parenting. I vividly recall a third grade teacher choosing to read to the class an essay that I had written as part of a homework assignment. I cannot recall the subject matter; however, I do recall the feelings that were evoked, and now, some 65 years later, I am beginning to understand why. Much of the time in between has been spent developing the skills of writing and observing, to the point that they have merged through the medium of the honey bee.

Incidentally, that third grade experience may also have spawned a desire for an audience and for recognition!

I have neither musical talent nor appreciation, and the years spent trying to develop the associated skills have been frustrating and fruitless. Learning to play the piano is an example, an area in which my mother's support and tuition was totally unsuccessful. Don't dare get me on a dance floor! You won't recover from laughing and I won't recover from the humiliation.

In the 1960s, Dr. Thomas Gordon, a Californian with three Nobel Prize nominations, developed his Skill Development Ladder, a four step process describing how we acquire a skill. We are all initially *unconsciously unskilled.* Take the example of flying a kite. At first glance, it seems simple – go outside, throw it in the air and run, a la Charlie Brown. Fishing might be another good example – sit on the bank, throw in a line with a worm on a bent pin and reel them in. It's when we actually try it that we realize

Gordon's Ladder

The Rungs of Learning

Unconsciously Skilled
- Now we do it without thinking
- Relaxed automatically

Consciously Skilled
- Now we know that we can do it
- Comfortable, competent

Consciously Unskilled
- Now we know that we don't know things
- Uncomfortable, anxious

Unconsciously Unskilled
- We don't know what we don't know
- Blissful ignorance

there are artifices involved that we don't have but which, with persistence and guidance, can be learned. Dr. Gordon called this *consciously unskilled.*

My guess is that when a talent and a skill are in harmony, it is easier to persevere through the initial disillusionment.

The third stage is one of being *consciously skilled* as one's patience and tenacity are rewarded, until eventually one flies a kite on the beach while talking to a group of onlookers, or sits by a line in the water while reading a good book (or in today's world, checking one's phone). The skills are taken for granted and one in *unconsciously skilled.*

I recall my granddaughter, Nora, several years ago asking from the backseat if driving a vehicle is difficult. I tried to explain that mostly I did it without thinking – changing gears, pushing the gas pedal, braking – and when she looked uncertain (perhaps concerned?) we discussed how she had watched her youngest brother learn to walk, the amount of effort that initially went into each step, and how now he skipped and ran without conscious effort.

How does this relate to beekeeping and to bees?

First, Colony Collapse Disorder (CCD) has drawn significant attention to the plight of honey bees and the enrollment in new beekeeper classes has been prolific. In my experience, about 25% of those who sign up will persevere after the first year, and the reason may be tied to talent. All are well meaning – "I must do something to help the bees" – and managing a hive is the first to come to mind. Many are unconsciously unskilled and as the reality becomes apparent and the romantic expectations fade, they decide on alternative means of helping the girls. Then, there are those who, whether they know it or not, have a nature-based talent for whom beekeeping ties into the bigger picture. Being consciously unskilled is not fearful so much as a challenge, they quickly see connections, are undaunted by failure and approach the learning process as one of constant enlightenment.

Many of us have witnessed this first-hand as mentors. Some new beekeepers move confidently through that vital first year, absorbing everything they experience. Others, should they persevere, keep asking the same questions in subsequent years and doing the same repetitive things, constantly appealing to their mentor to visit. How to gently encourage them to let go is something I have never successfully managed to do.

Secondly, I recall being told as a young teacher that good students are humble because they realized how little they know, whereas poor students are over-confident because they are unaware of how little they know. One of the challenges of a mentor is to persuade good beekeepers, in the latter steps of their learning, that they have become unconsciously skilled, that they know more than they realize and have much of value to share either with the public or with colleagues who are tentatively putting their first foot on the ladder.

This is not to suggest that the learning stops – ever. Once we have reached that top step and got our breath back, invariably there is another ladder waiting to be climbed. It is when I was unconsciously skilled in hive management that I began to focus on queen quality, something of which previously I had been blissfully unaware, or in Dr. Gordon's phrase, unconsciously unskilled.

And what about the bees? Do they go through this same process? Not at all. They are not thinking, reasoning animals with talents and skills, despite having a surprisingly large brain for their size (which primarily receives and organizes stimuli from the various ganglia) and despite our attempts to anthropomorphize them. Dr. Gene Robinson showed in the March 2021 issue of *Bee Culture* how some bees work harder than others, some sleep more or groom more, some drones fly higher, but in essence they are superbly tuned, genetic creatures, honed and refined over millions of years of evolutionary struggle, who emerge from their cells programmed to perform a series of tasks for the common good until they die.

The equivalent might be having a baby which, immediately after birth, cleans out the delivery room so that it is ready for the next occupant!

Off the Wahl Beekeeping

THE LIFE OF A WORKER BEE

Richard Wahl

Her Royal Majesty the Queen:

Before any discussion about worker bees, we must first look at what it takes to be a queen. The queen's pervasive pheromones in the hive ensure workers that there will be a continuation of progeny to support all the required hive tasks. But what made her so special to be selected as the queen? Most likely the previous queen was not living up to expectations, showing signs of aging and no longer capable of laying anywhere from 1,500 to 2,000 eggs a day. She may have been injured by one of those intrusive human invaders or simply exhausted her egg supply after a busy two to three year lifespan. If she was lucky, she may have even lived to the ripe old age of five years.

Supersedure cell upper left, queen cup to middle left and possible swarm call with larvae on lower right. Photo by Sue Howe

But the workers can sense when a queen is failing, and even when not failing, they will build three to six emergency queen cells normally along the bottom of a frame. In the event the hive is becoming overcrowded, that queen cell may be in the middle or upper portion of a frame, which usually indicates the potential for a supersedure of the failing queen. Whether the ailing queen must lay an egg in the queen cup or the workers move an egg to a queen cup is still a subject up for debate. Having seen ants and termites moving eggs, it does not seem to be much of a stretch to believe bees, as an adept society, would also be able to move eggs. In either event, once the egg is in a queen cup the workers will expand that cup into a peanut shape and continue to feed the larva that has hatched after its three days as an egg. The bees continue to feed a special mix called royal jelly. The continuation of the feeding of royal jelly throughout the larva stage is what determines this particular cell will become a queen. After five and a half more days as a larva, the cell that is at least twice the size of a worker cell is capped. Another seven and a half days will pass when the new queen will emerge from her cell. From egg to emerging queen takes only sixteen days, despite her being a larger sized bee. It may take a day or two for her to orient to the worker bees and hive around her, after which she will leave the hive to mate. She may take multiple flights to drone congregation areas, where she will mate with as many as fifteen to twenty willing drones. (I'll say a bit more about drones at the end of this piece.) The drone congregation areas she visits are normally a bit farther away (up to five miles) than the two to three mile range where her workers are scouting for nectar and pollen. That way it is more likely that she will mate with drones from different colonies thus increasing the genetic diversity of her offspring. Having completed mating flights, she returns to the hive to never leave again (unless moved by an intrusive human or having the urge to swarm) and begins her reign as queen. A new queen may lay more than one egg in a cell but this is very short lived, if it happens at all, and normally clears up quickly as the a new queen gets her bearings. It may take two to three more days for her to become a competent egg layer as she finishes her growth to a full sized queen. The whole process from egg to new laying queen may take a month or a bit more, depending on advantageous weather during the mating flights.

A new 2022 queen in the middle bottom shaded portion.

Those Dedicated Workers:

Now that there is a queen in the hive, the worker's jobs can be examined. The workers start out as eggs laid by the reigning queen. The queen can lay as many as 2,000 eggs in a day. For the first day the egg stands upright, one end gradually tipping to lie prone. In this way the beekeeper can tell how recently the egg was lain; if upright then within the past day, if laying more prone then it is two or three days old. While in the egg stage, other newly emerged bees store royal jelly around the egg.

The three day egg stage average can vary by as much as a day either way since egg growth is temperature dependent. After about three days, the egg hatches and becomes a larva feeding off the royal jelly. The core of eggs and larva are kept in the 93°F to 95°F (34°C to 35°C) range during this development stage. In nearly all cases, the bee will become a worker and so the diet is changed to the addition of pollen and honey secreted by attending nurse bees. The larva grows rapidly on this additional protein diet for about six more days after which the larva is capped and continues growth as a pupa in the

Day old eggs in middle of workers.

enclosed cell. While the larva is growing on its side, it is breathing through a spiracle on one side of its body. This is why it is important to not roll a larva when grafting for queen cell starter cups. If the breathing side is blocked it will result in the death of the larva being moved. At about the ninth day, after being laid as an egg, the larva is capped by attending bees and moves into its pupa stage. As mentioned in a previous article, just before capping is when the mites like to move in to feed off the pupa body fat and multiply as the pupa grows. The new bee pupa continues to grow in the cell surrounded by the protein pollen and honey mix previously loaded in the cell by worker nurse bees. On around the twenty-first day, the pupa has grown into a mature bee and emerges from the cell by chewing through the capping. This is when the job assignments of the worker bee begin.

The Jobs of Worker Bees:

It is well known that worker bees can adapt to the varying strengths and needs of the hive, as well as nectar and pollen availability and weather conditions. Therefore, this sequential list of worker bee jobs is relative to the surrounding conditions and can vary greatly depending on the season. The first job of the worker is to clean out its cell in the brood nest. This may include cleaning surrounding cells if a neighboring larva or pupa did not survive. This work could go on for a few days or up to two weeks. During this time, the new bees are heavily feeding on pollen and honey/nectar stores. After this, the worker will become a nurse bee secreting royal jelly for eggs, feeding and caring for larva.

Some workers may become queen attendants, feeding and grooming her and transmitting her pheromones to other bees. Having completed these jobs in the first two weeks of their life, the workers may become wax makers using glands under their abdomens to secrete small flakes of wax. In this way, they can cap larva and draw out new comb. In addition to wax making, sometime after the two week point, the workers will transition to receiving, ripening and depositing nectar and pollen in the hive. During this stage, these "house bees" receive the nectar from foragers, processing it in their honey stomachs and storing it in cells. They also transfer pollen from foragers and pack it into pollen cells in the hive. They convert tree resin into propolis used as bee glue to seal cracks in the hive and use it as an antiseptic due to its antibacterial qualities. They may also consume water brought in from foragers or pass it onto other bees. The workers are also ventilating the hive to evaporate moisture from the honey and the wax makers are capping full honey cells when the correct low moisture point is reached. These house bee jobs may go on for two or three weeks. During and after these jobs, some workers may be designated as guard bees inspecting returning field bees to allow admittance to the hive and deter invaders from entering. Similarly, some workers are removing debris and diseased or dead bees from the hive as mortuary workers. Only after completing a tour of duty as a house bee, will the worker become a forager. Prior to becoming a forager the workers will make orientation flights around the hive to become familiar with where the hive is located. This will also occur if the hive surroundings have changed or if they have been confined for a period of time. Since many bee sisters were eggs and larva at the same time, they reach orientation flight at the same time and it is not unusual to see a large number of bees circling outside the hive entrance for a short period. These are the bees that have passed through the caretaker and house bee stage of their lives. After a few orientation flights near the hive, workers will become foragers. Worker bees taking on a specific role normally remain in that role for the duration of their lives. For example, if a bee becomes a water collector it will most likely remain so. The same is true for pollen, nectar or resin collectors. Since foraging can require long and/or many flights that may be fraught with danger from other predators or pesticides, the worker bee's lifespan may vary from a few days up to another month. They will eventually wear themselves out resulting in the bee's death. The approximate time frames given in all cases above can vary greatly dependent on the weather and season. The lifespan of Summer bees will normally be from four to six weeks while bees emerging in late Fall could live up to six months in some long Winter areas.

Worker Bees as Scouts:

Bees may decide to swarm from the hive due to a variety of reasons. The most common reasons are due to overcrowding (frames filled with nectar and pollen with no room for the queen to lay eggs) or the ever present urge of every living organism to reproduce. Swarming may also

Worker bees attending to larva.

be caused due to an excessive mite population, continual over heating or absconding, simply to go to a better location. A more in depth article about swarming may be appropriate for a future essay. In any case, bees preparing to swarm will engorge themselves with honey and at some point anywhere from one-third to two-thirds of the hive population may leave. Normally, these bees with their old queen will settle as a cluster somewhere in the proximity of the parent hive and several dozen worker bees designated as scouts will fan out in different directions to look for a new cavity to call home. As each worker bee scout promotes their found location, other scouts go to review those locations and eventually a consensus is reached as to the best new site. This process may take anywhere from a few hours to a few days, often depending on the weather. These worker bee scouts then guide the swarm to the new home. The swarm is made up of a variety of workers as described before, but many of whom are ready to draw comb and prepare cells so the queen can begin her egg laying. I had the occasion to watch a swarm leave one of my hives a few years ago and it was the most exciting, exhilarating and disappointing thing at the same time. I knew I should have split that hive after an earlier inspection.

Laying Workers:

Since all the workers in the hive are sisters (or half-sisters), there may be occasions when workers lay eggs. This will normally occur if the hive has been queenless for three weeks or more. Since the queen pheromone is a key component in keeping the hive organized, its loss results in chaos in the hive. As a last ditch effort to keep the hive going, some of the workers reproductive organs develop and they start to lay eggs. Since these workers have never mated and are laying unfertilized eggs, they can only produce drones. And as the standard worker bee is smaller than the queen, their smaller abdomen cannot reach the bottom of a cell and eggs are attached to cell sides or more than one egg appears in a cell in a chaotic arrangement. Other workers elongate the cells for the drone larva and patchy networks of cells appear that have raised caps since drone cells are larger than worker cells. Eventually, the hive will decline with a decreasing number of workers and increasing number of drones and it will fail. It can be quite difficult to correct a laying worker hive and may not be worth the effort. Since laying workers are now giving off their own pheromones, they will kill any new queen introduced to the worker laying hive. A better option is to shake bees off any worker laid frames outside a stronger hive and combine the remainder of the worker laying hive to another strong hive using the newspaper method. I have had success shaking the frames with laying workers off outside the hive, adding a strong brood frame or two to the laying worker hive along with a queen from a nuc. The nuc was meant to be turned into a hive at some point anyway. I would not take brood frames from another hive to do this, as it only weakens the donating hive. The organized nuc bees and queen take over the hive and order is restored, but only if laying worker frames are shook off outside the offending hive.

Results of laying worker bees.

Capped drone cells from laying workers.

Drones:

A ten to fifteen percent drone population in a hive is a sign of a good hive. The drones are male bees and have one purpose in life which is to mate with new queens. They do not sting, do not work and do not make honey or collect nectar or pollen. Drones are raised in cells that are slightly larger than the worker cells and have more of a bulbous cap on them. Just as before, they spend about three days as an egg, six and a half days as larva and another fifteen days as a pupa resulting in twenty-four days from egg to emergence. Drones may live up to two months and fly to drone congregation areas where they hope to mate with virgin queens. If a drone mates with a queen, they die soon thereafter as they lose their male parts in the mating process. Unfortunately for the drones, as Winter sets in, they are usually expelled from the hive to die in the cold since no queens will be mating in the Winter months and the workers are loathe to feed these Winter freeloaders. The beekeeper or human manager of the hive will soon find there are no absolutes in working with bees. Most of this discussion is a result of my own experiences with bees which I have found to be a most amazing sustainable organism. When given adequate shelter, occasional food assistance and most critically, the monitoring and treatment for mites as well as any noted disease, they not only provide critical pollination services but perhaps a bit of extra honey for us humans to enjoy. As always, your experience may vary based on your environmental conditions, experience or state of your hives. Continue to watch and enjoy these amazing creatures.

HONEY BEE HUSBANDRY IN PLASTIC HIVES

Listen along here!

Surprisingly, beekeepers have a long plastic hive history.

It seems to me

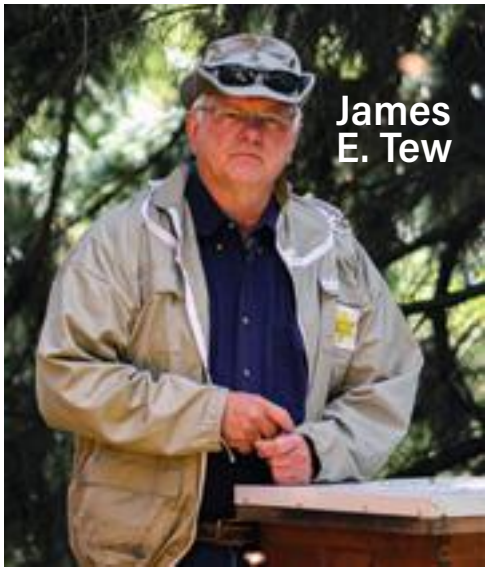
We all have our reasons that determine what we house our bees in. Our ancestors used box hives and the occasional skep. In all my bee life, I have primarily used ten-frame, wooden equipment. I use that kind of equipment simply because I have always used it. Some of you use eight-frame equipment. Others are eager to use top bar hives or other such related styles.

Many of you even use various types of plastic hives that are offered in multiple sizes and chemical configurations. Plastic bee hives – in one form or another – have been presented in supply catalogs at least since the late 1960's. Honestly, plastic hives cannot really even be called a new idea.

Wood and wax

I've always been a wood guy. The odor of new pine wood blended with the smell of beeswax has always pervaded my beekeeping life. As the years have passed, increasingly, that smell always took me to beekeeping. Even now, the smell of newly milled pine brings back pleasant memories of new wooden bee equipment. And, of course, the odor of beeswax and combs is the classic aromas of bees' world. These blended odors are the very essence of olfactory beekeeping.

Ironic to admit to you that I have been a woodworker longer than I have been a beekeeper. So, If I am so committed to woodworking, and spent several years building all my hive parts, why do I have *any* interest in plastic bee hives? Short answer – I really don't know, but please don't stop reading yet. I think I can explain.



Readers, this is not a comprehensive history piece...

While I believe that a thorough review of the decades-long plastic displacement of nearly everything wooden or metal in beekeeping would be interesting, that endeavor is beyond my ability and certainly beyond my space limitations here in *Bee Culture*. In this article, I will only be referring to plastic beekeeping events that have influenced me personally, and in fact, continue to affect me to the present time.

The Walter T. Kelley Bee Supply Company and plastic hives

I mean no omission to any manufacturer, but in my early bee life, the big three bee supply companies were: Dadant and Sons, The A.I. Root Company and the Walter T. Kelley Company[1]. Shortly after beginning beekeeping in 1972, I realized that the Kelley Company was offering single-piece, plastic inner covers, outer covers and bottom boards. This equipment was touted as rot-proof and maintenance-free. In 1975, three years later, Kelley added plastic hive bodies in two depths.

There it was – a bee hive made entirely of plastic[2]. How modern! While I was dedicated to woodenware, this prominent supply company was seriously delving into plastic rather than wood as hive building materials. Though the Kelley Company maintained its wooden hive production capabilities, it was intriguing that heavy-duty, plastic hive equipment was also offered. This was a major bee supply company manufacturing

Figure 1. An old, soiled Kelley Plastic Hive, circa 1980.

plastic equipment and I admit that I was influenced by their plastic inventory offerings.

I recently spoke with a Kelley representative

A long time representative of the Kelley Company said that all the plastic hive components were manufactured for many years by several different plastic molding companies in Indiana and Arkansas. The sole piece that remains in production today is the outer cover. After so many years, why did this kind of equipment phase out of their catalog?

Through the years, the plastic molds aged and began to show wear, production companies change and beekeeper interest in this style of hive waned. Over time, the hard plastic hive components were dropped from the catalog.

My experience with the Kelley plastic hives was more positive than negative. Yes, the hive equipment did not "breathe" and needed more Winter ventilation. Some of the pieces, such as the inner cover, would slightly bow at the hand-hold spot in the middle of the inner cover. Later models of the plastic inner cover had support points to address this issue. Bottom boards also deflected some, but that issue, too, was rectified.

The equipment was rugged and weighed about the same as a compa-

[1]The Walter T. Kelley Company is now affiliated with Mann Lake Bee and Ag Supply, https://www.mannlakeltd.com/catalog/

[2]At that time, the frames were still wood, and the foundation was beeswax sheets. Frames and foundation were not made from plastic.

rable wooden hive body. The plastic equipment did not require painting and was wax moth and termite resistant. Since the frames were generally made from wood and beeswax, it seems to me that the bees readily accepted the plastic hive body components. Lastly, as I recall, the selling price was similar, too.

As I write this, I wonder if this plastic equipment – or any plastic equipment for that matter – could be sterilized if American foulbrood was found? I can't answer my own question. Certainly, plastic could not be scorched with fire as has been done with wooden equipment.

My alarms are sounding

This article is not developing along the pathways I anticipated. I have mental alarms going off. Increasingly, in this piece, I am flirting with the concept of providing reviews for plastic equipment use in my apiary. That is not my intent, but how do I describe one product that I own and not mention the others that I also use? So here I am – getting in deeper and deeper as I write about plastic bee hives.

Other plastic equipment in my apiary

I presently have – and use – plastic hive components from *Mother Lode*, *Beaver Plastics* and *Bees Forever*.

Mother Lode Products[3]

I have used a couple of UV Stabilized Polypropylene hive bodies from Mother Lode Products for several decades. What can I say? My pieces of this equipment have sat outside without maintenance or paint for all those years. The hive bodies have been consistently rugged and stable. The bees seem okay with them, and wax moth and carpenter ants have not been a factor.

The R-Value insulation rating simply has to be low. The plastic is nearly translucent at its thinnest points. To compensate, on their web page, the company refers to *insulating panels* for Winter use, but I have no experience with that equipment. I post no recommendations, but after all these years, I have no complaints with my pieces of this equipment.

[3]Mother Lode Products. https://www.motherlodeproducts.com/

Figure 2. A decades-old Mother Lode plastic hive body.

Beaver Plastics and Bees Forever

Two other types of equipment that have been in my apiary for many years are from *Beaver Plastics*[4] and *Bees Forever*[5]. The Beaver Plastics design is thick polystyrene, while the Bees Forever design, like the Mother Lode Products, is hard plastic.

Figure 3. Two types of plastic bee equipment on the same colony. (Bees Forever on top and Beaver Plastics on bottom)

Both products are produced as a single piece molded plastic. That design generally increases shipping costs, but there is no assembly time required. The Mother Lode equipment was shipped flat so it required simple assembly.

Bee Max and Lyson polystyrene hive equipment

Bee Max[6] and Lyson[7] are both manufacturers of plastic bee hive systems. I do not have experience with either of them, but they are both readily available in the bee industry.

Readers, plastic equipment supplies and abundant styles are available worldwide. Earlier in this article, I indicated that my alarms were sounding. That is still the case. With so many options and so many suppliers, I will most likely get something wrong here. The reader will have to talk to beekeeping friends and peruse the beekeeping equipment internet to make a final decision on this subject.

[4]Beaver Plastics. https://workerandhive.com/products/beaver-plastics-polystyrene-brood-box

[5]Bees Forever. https://www.facebook.com/people/Bees-Forever-Plastics/100066450133863/

[6]Betterbee. https://www.betterbee.com/beemax-hive-kits/blk1-beemax-light-weight-kit.asp

[7]Lyson. http://lyson.eu/ule-styropianowe/5444-amercian-langstroth-bee-hive-8-frames-roof-2-x-body-bottom-not-painted.html

Bee Box[8] from Paradise Honey

I wish I could write that I had specific reasons, but honestly, I purchased enough equipment for two hives and a queen mating nucleus hive manufactured by Bee Box from Paradise Honey for mundane reasons. I made the decision to purchase this particular model simply because it was available at the moment, I had my truck with me, I had decided to purchase some polystyrene equipment and the company would take a credit card. After several seasons of use, all has gone (mostly) well. I have used this equipment for several seasons and am comfortable providing the following conversational points.

Applying glue to joints is required

Though this unit was easy to assemble, glue must be used at the time of assembly. The same glue used to assemble wooden equipment is appropriate for assembly of this thick polystyrene equipment.

I was eager to get bees in some of my new-fangled equipment so,

[8]Blue Sky Bee Supply. https://blueskybeesupply.com/hive-components/polystyrene-hives-components/

Figure 4. A cracked joint. My fault. I should have applied glue at the time of assembly.

without gluing, I snapped one deep together and got a colony established in it. As time passed, the joints on that unglued deep opened a bit, and the bees quickly filled those crevices with propolis. Now it will be difficult – short of complete disassembly – to make needed changes and correctly apply the glue. My lesson learned – apply glue at the time of assembly.

Painting

After assembly, I used my small airless spray paint equipment. Brushing the latex paint on would certainly have been fine, but I had the spray equipment, and it was faster than brushing. I applied two coats. On the hive bodies and supers, I taped off the contact points where the hive tool will be used. I did this not because it was necessary, but primarily because it made the final paint job look nicer.

Figure 5. Painting polysytrene hive bodies with latex paint. Note blue tape application.

After beginning to use the equipment, I had problems with the paint sticking to mated surfaces of the hive bodies. I sense that this was a paint issue more than an equipment issue. I waited a couple days before using the newly painted boxes, but they still stuck together and pulled some of the paint off when I later separated the boxes. What to do the next time? Possibly coat the broad painted edges with beeswax or simply do not paint the edges at all. Any suggestions?

Hive tool use

Hive tool use must be modified – particularly when removing outside frames. If I used my hive tool to pry out a frame near the side wall, I could unintentionally put pressure on the glued corner joint. Traditional wooden equipment could easily withstand this corner stress, but when using polystyrene, more care is required. In fact, I did break a joint that connected the front with the side. I referred to this incident before.

Maybe I should have used more glue to strengthen the joints, but what I have been doing that works very well is to use a "frame grip." First, I break the frame free. Then, using the grip with a hive tool assisting as needed, I remove the first frame.

Figure 6. A frame grip and a hive tool used to remove frames. The hive tool can only be used at yellow surfaces. Note some of the green paint pulled off at the corners.

Overall, when handling a full deep of bees and honey, I had a sense that this box would not withstand rough treatment or being "racked" by stressing the load on the corners. Just knowing this is enough to handle a full polystyrene box differently than I would handle a wooded deep hive body.

Bees and animals gnawing

I knew that under some conditions, bees will gnaw and chew the polystyrene surface and corners. To help forestall this potential problem, I chose to paint the inside of my equipment with latex paint. Others may not want to paint the inside and I understand that. Paint the inside or not – that will be your call.

Figure 7. Animals gnawing on plastic equipment. Squirrels?

Even so, most likely at some point bees and/or animals are going to have a chew on this plastic. But chewing animals will also chew on wooden equipment. I consider animals chewing the equipment just to be routine "wear and tear" but what about the bees occasionally gnawing on the equipment? I have wondered if coating the inside of the polystyrene equipment with beeswax would help? *(Straight up – let me say that I really doubt that I will ever try that. Too much work. If you do, I hope you will let me know how it worked out.)*

Of course, under failed conditions, wax moths will chew up anything. No surprises there, but I did have some unexpected challenges having carpenter ants that constructed nests inside the thick walls of the bee boxes. They were not difficult to shake out, but the equipment was blemished by their activity.

The good points

Insulation – no doubt about it. The thick walls insulate the sides and ends of the hive. To an extent, both the bottom and the top are insulated, too. Brood may be put in combs along the side wall if the colony is populous, and the brood nest is crowded. This nearly never happens in simple wooded hive bodies.

I cannot yet say that it was wildly helpful during Winter, but all other things being equal, I would expect the insulation effect to be significantly helpful. Adequate ventilation is important.

The equipment fits together nicely and, at least with the equipment I am using, I can readily interchange wooden equipment with the plastic equipment. The equipment has a snug fit and once propolis is added, the unit becomes a firmly meshed hive.

Once painted and cured, the equipment requires few concerns. A positive point with

Figure 8. A polystyrene hive with a top feeder.

no other real place to post it is that the top feeder, once painted and installed, fits snugly and is water tight without any seepage. A top feeder is shown on the polystyrene hive in figure 8.

So, now what?

Should I use plastic equipment, or should I never use it? As is so often the case in beekeeping, the answer to that question is purely your call. I explained why I have primarily used wooden hive equipment, but the plastic equipment experience adds variety to my apiary. I like the diversity, but I truly like the smell of freshly milled pine, too.

I always appreciate you reading, thinking and communicating with me on these subjects. It's how we all grow. Thank you.

A bit of a discussion on this plastic hive subject

There is a discussion on pros and cons of plastic equipment, albeit a bit dated, at: **https://www.beesource.com/threads/advantages-and-disadvantages-of-polystyrene-hives.320176/**

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Baked Brownie Oatmeal

Shana Archibald

Ingredients

- ☐ 2 cups of milk (you can use coconut, almond or cow)
- ☐ ½ cup of honey
- ☐ ⅓ cup of peanut butter
- ☐ 1 tsp baking powder
- ☐ 1 tsp vanilla extract
- ☐ 1 tbsp flax seed
- ☐ 2 cups rolled oats
- ☐ ¼ cup cocoa powder
- ☐ ½ cup chocolate chips (or more! Measure it with your heart haha!)
- ☐ Pinch of salt

Directions

Step 1
Preheat oven to 350°F

Step 2
Combine everything into a large mixing bowl and stir.

Step 3
Place into a 9x13 baking dish and bake for 40 minutes. Enjoy!

CALENDAR

♦INDIANA♦

The Beekeepers of Indiana are holding their Fall Conference and Workshops on Friday, October 28-Saturday, October 29, 2022. The location is Terre Haute Convention Center in Terre Haute, Indiana.

Jamie Ellis from the University of Florida and Sam Comfort from Anarchy Apiary will be our Plenary Speakers.

Some breakout sessions include: Producing Comb Honey and Splitting Hives. Hands-on workshops include: Building Hive Equipment, Wax Rendering, How to Make Beeswax Soap and the return of a favorite: Making Candy Boards.

Big hits from last year will be returning: the Smoker Contest and the Honey Show. Rules can be found on the website.

Cost per member is $40 and non-members is $50. All children 15 and under may register for $25. Registration is required to attend both days and participate in any events. Juice and coffee will be available Saturday morning and your registration includes an Italian Buffet Lunch.

More information about the agenda, workshops, directions, links for hotels, etc. are available on the website at **https://indianabeekeeper.com/events/fall_conference**

♦IOWA♦

Iowa Honey Producers Association 2022 Conference and Fall Meeting will be held at the Gateway Hotel and Conference Center on November 11-12, 2022.

Speakers include Juliana Rangel Posada, Randy Oliver (Zoom), Michael Palmer (Zoom) and Eugene Makovec.

The two day event will include speakers, breakout sessions, vendor hall, Friday night banquet, live and silent auctions and more.

For online registration: **ihpatreasurer@gmail.com**

♦KANSAS♦

Kansas Honey Producers Association Fall 2022 Conference will be held in Salina, KS at Courtyard by Marriott on November 4 and 5, 2022.

Speakers include: Katie Lee, Randy Oliver and many more.

See **www.kansashoneyproducers.org** for more information.

♦MISSOURI♦

Missouri State Beekeepers Association is having their Annual Fall Conference in Cape Girardeau, MO on October 14-15, 2022.

Featured speakers include Dr. David Tarpy – North Carolina State University, Kamon Reynolds – Tennessee YouTube beekeeping instructor, and virtual speaker Dr. Heather Mattilia – Wellesley College Massachusetts, Associate Professor of Biological Studies.

An option to participate virtually is available. Non-members can register for the webinar and become a member for a $10 annual membership fee. Members will receive an email with the Zoom link prior to the conference.

More information can be found at: **https://mostatebeekeepers.org/october-14-15-fall-conference-in-cape-girardeau/**

♦NEBRASKA♦

Omaha Bee Club is hosting their second annual Bee Convention on Saturday, October 15, 2022.

With 16 presentations and demonstrations, spacious vendor spaces and a silent auction there is something for all beekeepers.

Go to **www.OmahaBeeClub.com** for more information and to sign up.

♦NORTH CAROLINA♦

Union County Beekeepers are holding the second annual Bee Palooza on November 7, 2022 from 5:30pm to 9pm.

This year's keynote speaker will be Laurie Hamin PhD Department of Entomology and Plant Pathology NC State University. She will present on what a grocery store would be without pollinators.

The event will include a silent auction, food trucks, a professional honey judging contact and honey tasting.

Register online at **https://www.ucncbeekeepers.org/**

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FOR SALE

- North Carolina Italian queens $30 each pickup or shipped. 5 frame nucs available all Summer $140 each. Singles and double deeps for sale. Timmy Holt **336-710-4904**
- Bee business for sale in southeast Georgia. Hives (200 8-frame), Nucs (200, 5-frame), 10 apiaries with 250 extra spaces, 6 bee trailers, 300 hive pollination contracts, and misc. supplies. Text **912-426-9099** or email **jimmyr@pineland.net**
- Honey farm for sale in PEI, Canada. Turn key business comes with 300 well established hives, blueberry pollination contracts, Summer and Winter bee yards, all equipment (tucks, trailers, crane, tractor, etc.). Good wholesale network and customer base. Set up for growth up to 1,000 hives. All equipment in place for commercial queen rearing and nuc sales. **https://www.realtor.ca/real-estate/24374828/6718-route-19-canoe-cove-canoe-cove**. Call John Dicker **902-393-8815** or email **johndicker@royallepage.ca**
- 400 hives +/-, 1 deep, 1 medium (10 frame), mostly coy russian genetics, 25 hive minimum, $200, available October 2022-March 2023, treated for *varroa* with Apiguard in July & August, boxes boiled in food-grade parafin, **830-275-8858**

Contact Jen Manis to place an ad: Jen@BeeCulture.com

♦OHIO♦

We hope you will join us for the **Ohio State Beekeepers Association** Annual Meeting and Fall Conference "Why Did My Bees Die" on October 28-29, 2022 at the OSU OARDC Campus, Fisher Auditorium and Shisler Conference Center in Wooster, OH.

Speakers are Dr. Samuel Ramsey, Dr. Jon Zawislak, Dr. Reed Johnson and many other top presenters. Friday evening social will host speaker Dr. Jim Tew.

Full day of bee-related lectures and workshops, local and national vendors, honey show and catered hot lunch available. Please visit our website at **https://ohiostatebeekeepers.org/** for program, registration and accommodation information.

♦OKLAHOMA♦

Oklahoma State Beekeepers Association will be holding their annual Fall Conference on October 29th at the Will Rogers Garden Center in Oklahoma City.

Our headline speaker is going to be Randy McCaffery the 628DirtRooster.

Check out **www.SoonerBees.org** for more information and a list of activities.Contact Pat Tickel at **president@soonerbees.org** for more information.

♦TEXAS♦

Texas Beekeepers Association will be holding their Annual Convention on November 3-5, 2022 at the Mayborn Convention Center.

Their conference includes renowned keynote speakers, interactive classes, industry updates, legislative updates, and annual membership meetings.

To register visit: **https://texasbeekeepers.org/** or for more information contact Dodie Stillman at **vp@texasbeekeepers.org**

♦TENNESSEE♦

The Upper East Tennessee Bee Conference will be held in Greeneville, TN on October 15, 2022 from 7:30am to 6:30pm.

Speakers include Michael Bush, Kent Williams and more. Registration for adults is $35 with lunch included and only $5 for all children under 16.

For more information and to register, please visit: **https://www.tennesseehoneybees.com/**

If you are having a beekeeping event, we are happy to send back issues to give to your attendees and students. Please email Emma at Emma@BeeCulture.com with the number of magazines needed, a complete mailing address and a contact person.

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Image Contest - Winter Feeding

We've started an image gallery! This month, we want to see any and all pictures you have of **Winter Feeding**. Please make sure that your image is nice and big! We may pick your image for the gallery, or you have the chance to get on the cover! So get creative.

How To Submit:

Email your images to **Emma@BeeCulture.com**
Use the subject "**Image Gallery**"
Please include in your email:
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- Your First and Last name
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If your image is chosen:

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For the Cover:
You will get twelve months added to your current subscription.

It's August as I write, not the Fourth of July, but you should have seen and heard the fireworks when I inadvertently dumped the wrong honey into my sidekick Marilyn's special lavender-infused honey bucket. Unless you served in the Navy, you never heard such colorful language. I kept my head down. Later, I had to tickle her to make her smile.

Hey, mistakes happen! When folks ask, "How's your day?" I generally reply, " I haven't screwed up yet... that I know of."

Yesterday I made a *Varroa* mite-testing trip to an isolated high-country yard. The final half-mile I'd call wild and wooly. I took the all-wheel-drive Subaru, because it goes about anywhere – less clearance than the pickup but better maneuverability. What I didn't anticipate was the heavy rain the night before, and a phalanx of mud holes.

I charged ahead anyway. I tried to go around the mud holes but kept getting sucked in. I'd lose my steering down in the slop and pop out at weird angles. Luckily I didn't hit a tree.

Then I got to the place I knew would be the worst, and it was. A small pond covered the entire road, and the bypass that you're not supposed to use was underwater, too. At least I know when I'm licked. I somehow got turned around and had about as much fun getting out as I did coming in.

The experts say you should replace a third of your brood comb annually, at least partly to get rid of impurities that accumulate in the wax. These include pesticides, as well as the chemicals that we beekeepers sometimes have to resort to, to keep our little darlings alive.

But a third of your comb every year? I say easier said than done. You can put in all the new foundation you want, but if the bees aren't on a wicked honey flow, they'll do their best to ignore it. As my little darlings emerge from Winter, I've generally got one deep brood box full of bees and honey, and one pretty much empty. I figure if I can replace two old black combs from the empty super with foundation, and the bees actually draw it out, I've accomplished something.

I call myself semi-retired and keep only half as many hives as I used to, so I have plenty of spare equipment. A lot of my stored brood frames are at least partly chewed down to the plastic foundation by mice. For some reason, bees seem to love to draw out half-eaten frames. So if I put them in a honey bee brood chamber, and the bees draw out the mouse-eaten parts with brand new white comb, as neat as you please, does this count as comb replacement?

And all those mouse droppings on the top bars? Scrape 'em off if you must, but what if you didn't bother? I promise you, bees will tidy up those frames squeaky clean, cleaner than you ever could. You'll never know a mouse ever used them as a toilet.

Whoa, now! Am I making you gag? Is this sanitary, or okay to do? You'd have to ask an expert. I'm merely reporting to you what I've observed in the field.

This Summer (It's August, remember!) most of my locations haven't been very productive. "Pathetic" would aptly summarize my honey crop. But beekeeping's like fishing – it's location, location, location. And last year's hot spot might be this year's bust.

What I've noticed at my marginal yards is strong colonies making sometimes impressive quantities of honey, while their weak sisters right next to them practically starve. This brings me to an intriguing conclusion: the measure of a beekeeper's wealth, at least in terms of honey production, isn't necessarily the number of hives they own. It's more the number of bees and how they're divided into colonies.

Let's say you own a million bees in July. That could be 20 colonies with 50,000 workers in each. Fifty thousand is a strong population. If they got on a honey flow, they ought to kick it. But, what if your census came up with the reverse scenario – 50 colonies with 20,000 bees in each? You've still got a million bees, but these would be relatively weak hives, perhaps not strong enough to make a surplus on that same honey flow.

Marilyn keeps going on trips this Summer, like to New Orleans or Italy or school reunions, so she's not always making it to her farmers markets. With my honey production down, maybe this is a good thing, providing we don't starve. We have a revenue sharing arrangement. And I have my Social Security. Without it, I'd have to work 'til I drop.

Marilyn comes from a big close-knit Irish Catholic family, and this weekend is the sisters' get-together somewhere over by Denver. Marilyn's there right now. She called in a huff, complaining she received a pricey careless driving ticket for "swerving but swerving in my own lane. I only crossed the white line on the right once. I'm going to fight this!" When I gave her my take on the situation, she shot back that "You always take the cop's side!"

Later, she reported back that the sisters agreed that the sheriff's deputy was way out of line. But those girls stick together, always.

I don't know how Marilyn thinks she can get out of this. She's a free spirit, however, so technically the rules don't apply to her. She never leaves the house without an ace up her sleeve, and I wouldn't write her off quite yet. Life rolls her way, pretty much always.

Ed Colby

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