DOG V. MACHINE

NOV 2023

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The Magazine Of American Beekeeping

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A Closer Look – Queen Banks

The Honey Bee's Winter Nest

Petro Prokopovych

Happy Thanksgiving! From *Bee Culture*

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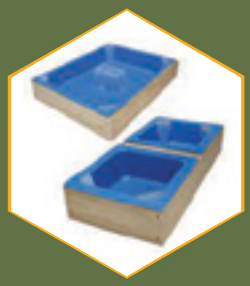

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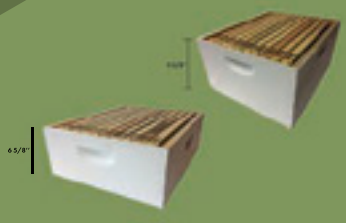

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Table of November Bee Culture...

Cover Photo by Deborah Sasser as part of our Image Gallery Photo Contest. Find out more about this month's theme *Holiday Hives* on page 95!

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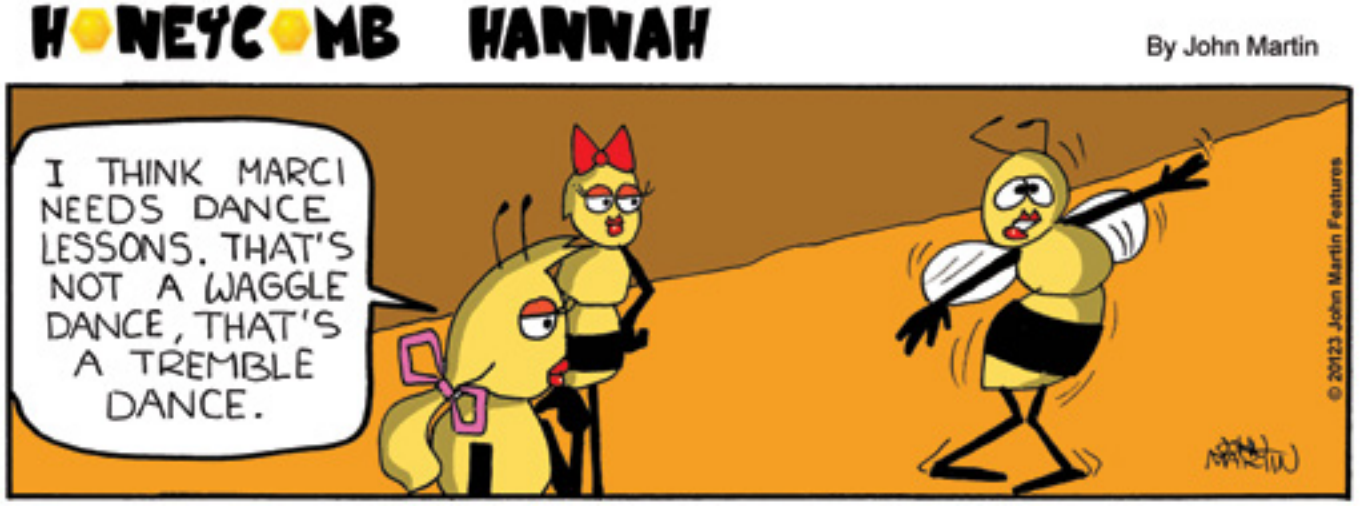

NEXT MONTH

Region 1
- Feed if needed
- Insulate and provide upper entrance for ventilation
- Too late to treat for mites
- Check bear fence
- Catch up on reading *Bee Culture*
- Make repairs on older equipment
- Be sure entrance reducers are in place
- Cover screen bottoms
- Hay bales for wind break
- Nothing

Region 2
- Check stored food supply
- Take a break!
- Reduce entrances
- Combine weak colonies
- Feed if necessary
- Repair equipment
- Install mouse guards
- Repair woodenware
- Happy Thanksgiving!

Region 3
- Sample mite levels / alcohol wash
- Remove unneeded boxes
- Make equipment repairs and paint
- Check for queen
- Feed sugar syrup if needed
- Purchase new equipment
- On warm days, do a quick inspection

Region 4
- Feed, feed
- Mite treatments are over
- 2:1 sugar syrup
- Insulate
- Mouse guards
- Put up wind blocks
- Wait for March
- Give them candy boards
- Repair equipment

Region 5
- Supplemental feeding
- Crack lid for ventilation
- Be sure they are wrapped
- Read *Bee Culture* and *ABC & XYZ*
- Protect from wind
- Start prepping boxes for Spring splits

Region 6
- Inspect hives
- Combine colonies that are weak
- Check colony weight / feed if needed
- Make sure *Varroa* is under control
- Insulate hives
- Be sure colonies have 30+ lbs of food

Region 7
- Strap hives down
- Insulate hives with wraps
- Insulate lids
- Move to Florida
- Plant forage for next year
- Check and clear bottom entrances
- Rest and eat Thanksgiving dinner

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 **Jen@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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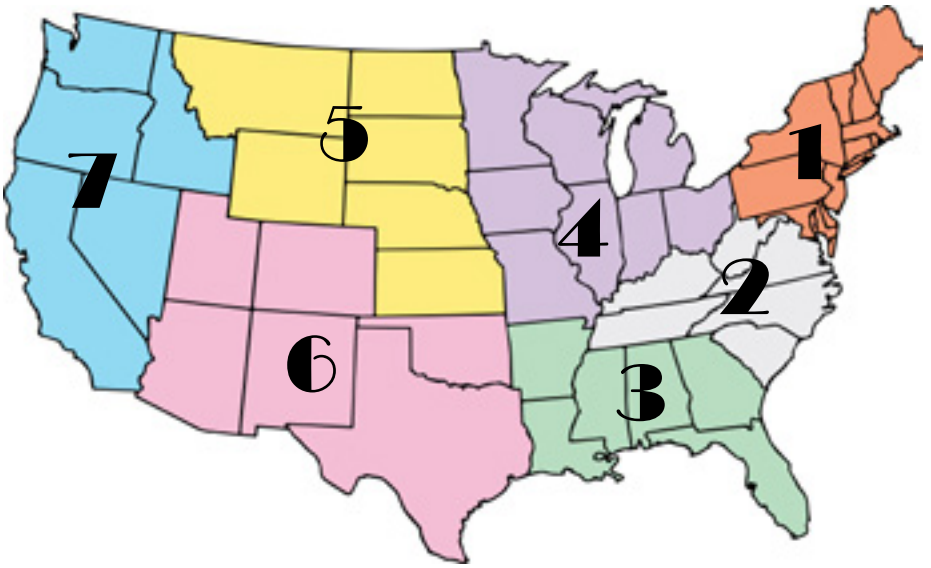

NOVEMBER – REGIONAL HONEY PRICE REPORT

REPORTING REGIONS											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	3.16	2.25	3.02	2.98	2.92	-	3.50	2.25-4.00	3.02	3.02	2.91	2.95
55 Gal. Drum, Ambr	2.83	2.89	2.51	3.07	2.94	-	3.38	1.00-4.00	2.89	2.89	2.85	2.83
60# Light (retail)	251.45	293.75	258.00	229.50	222.50	300.00	310.00	180.00-390.00	254.90	4.25	253.12	249.55
60# Amber (retail)	250.88	269.20	258.50	222.75	225.00	277.50	241.25	160.00-370.00	250.83	4.18	246.00	242.64
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	108.34	115.20	97.50	100.08	107.04	90.00	-	78.00-144.00	105.69	8.81	103.44	112.74
1# 24/case	165.67	177.00	161.00	144.76	176.95	162.00	144.00	102.00-264.00	161.53	6.73	161.87	160.87
2# 12/case	147.20	204.00	133.67	128.54	173.76	151.50	156.00	30.90-264.00	146.79	6.12	145.81	149.36
12.oz. Plas. 24/cs	134.61	155.10	113.48	110.37	119.70	120.00	117.60	78.00-240.00	126.39	7.02	128.57	122.83
5# 6/case	162.65	250.00	178.91	125.98	162.24	136.00	-	101.95-350.00	161.82	5.39	160.77	158.99
Quarts 12/case	203.00	215.70	157.83	181.20	194.16	231.00	205.50	120.00-276.00	198.21	5.51	197.06	195.85
Pints 12/case	120.00	133.20	97.55	111.63	141.19	121.50	115.20	72.00-270.00	123.00	6.83	127.32	119.96
RETAIL SHELF PRICES												
1/2#	6.63	6.59	5.48	5.44	6.23	6.25	-	3.59-9.50	6.22	12.44	6.17	6.31
12 oz. Plastic	8.45	7.54	7.06	7.13	6.62	7.75	6.38	4.34-12.50	7.62	10.17	7.63	7.71
1# Glass/Plastic	10.35	12.08	9.54	8.89	12.01	12.05	13.40	6.00-25.00	10.58	10.58	10.49	10.03
2# Glass/Plastic	17.65	19.27	17.25	16.17	21.55	17.75	22.00	10.89-30.00	17.83	8.91	17.76	18.09
Pint	13.88	13.84	10.25	13.27	14.10	15.60	12.92	8.00-30.00	13.25	8.84	13.39	12.43
Quart	23.52	23.37	20.52	21.86	17.34	25.20	23.06	7.24-42.00	22.45	7.48	22.20	23.09
5# Glass/Plastic	37.45	39.60	49.25	30.41	38.85	38.75	-	23.00-65.00	36.99	7.40	37.13	35.36
1# Cream	13.56	11.10	14.17	10.71	9.99	15.00	15.00	7.12-30.00	12.78	12.78	12.60	12.72
1# Cut Comb	16.33	14.96	15.40	14.56	12.00	-	-	8.00-30.00	15.45	15.45	15.80	15.46
Ross Round	13.25	15.00	15.16	12.00	-	16.99	15.25	9.00-24.00	13.82	18.43	14.43	13.35
Wholesale Wax (Lt)	8.18	7.69	8.25	7.25	7.33	5.00	5.43	3.80-10.00	7.52	-	6.98	8.58
Wholesale Wax (Dk)	6.63	7.64	6.75	5.37	7.50	8.00	8.00	2.25-10.00	6.94	-	6.36	7.54
Pollination Fee/Col.	126.00	80.00	97.50	110.00	200.00	-	83.33	50.00-400.00	113.40	-	102.88	111.78
Price of Nucs	182.86	179.44	171.25	180.11	170.00	229.80	178.00	125.00-250.00	183.47	-	184.45	-
Price of Packages	177.69	145.83	128.13	145.33	161.50	-	224.50	110.00-299.00	161.86	-	152.78	-

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.

How do you compare to our honey reporters? All data collected is from August/September 2023.

Average Honey Flow Time and Amount per Region

Region 1:
Timing of Flow: Normal
Amount of Flow: Average
Region 2:
Timing of Flow: Normal
Amount of Flow: Average
Region 3:
Timing of Flow: Late
Amount of Flow: Light
Region 4:
Timing of Flow: Normal
Amount of Flow: Average
Region 5:
Timing of Flow: Late
Amount of Flow: Heavy
Region 6:
Timing of Flow: Normal
Amount of Flow: Equally light and average
Region 7:
Timing of Flow: Equally normal and late
Amount of Flow: Average

Mite Treatment per Region

Region 1: Most used a Formic product.
Region 2: Most used a Formic product.
Region 3: Most used a Thymol product.
Region 4: Most used a Formic product.
Region 5: Most used a Formic product.
Region 6: Most used an Oxalic Acid Vapor product.
Region 7: Most used a Formic product.

Top Blossoming Plants per Region

Region 1: Goldenrod, Aster, Japanese Knotweed, Joe-Pye-weed, Buckwheat, Knotweed, Bamboo
Region 2: Goldenrod, Aster, Wingstem, Ironweed
Region 3: Goldenrod, Aster, Ironweed, Smartweed, Soybean, Wildflowers
Region 4: Goldenrod, Aster
Region 5: Goldenrod, Aster, Sunflower
Region 6: Sunflower, Goldenrod
Region 7: Dahlia, Sunflower

Overall Top Blossoming Plants

Goldenrod, Aster, Sunflower, Japanese Knotweed, Joe-Pye-weed, Ironweed, Knotweed, Smartweed, Wildflowers, Wingstem

STUDY HALL

LEAF BLOWER, REALLY?

QUESTION

Hi Jerry, do honey bees make wax cells at this time of year, late Summer, even though there is no significant nectar flow? I have two very populous, strong hives, and after extracting some honey (and leaving plenty) they have thoroughly populated the extracted (slightly wet) frames that I put back in. Will they make new comb? I'm wondering if I should leave these extracted frames in or not, they need space so I'm inclined to leave them. They have one deep and now four supers. They look healthy, active and disease free… Thanks!

Dan in SoCal

ANSWER

Yes and no.

Kind of depends at this time of the year (late August as I write this), where you are located and your temperature and flower resources available. Days are getting shorter and honey bees are aware that 'Winter' in one form or another is coming and they need to store as much honey for those Winter dearth days coming up as possible. It's all about resource insurance for survival. Asters and goldenrod are the usual Fall honey producing flowers, which if in enough area, density can add a significant amount of honey to these colonies preparing for the Winter. So yes, in a perfect world, if your temperature, and flower nectar resources are sufficient, and the colony needs the space, they will most certainly build or repair comb to allow this nectar/honey to be stored and created. If any of those conditions do not exist, then the colony does not have the resources to build/repair comb. They can't as they don't have the tools.

Leave the combs in and see what the Fall flow brings the colonies or not. Beekeeping is a semi-organized experiment with honey bees, and the environment. Enjoy and learn.

Reply from Dan

Thanks Jerry! Always appreciate your words of wisdom… I'll leave in the just-extracted frames and recheck in a couple weeks.

MORE SUPER CLEARING

QUESTION

Hi Jerry, I have another quick question for you, and perhaps for Ross Conrad as a "Natural Beekeeper". I'm considering using one of the several bee removal products on the market for my next honey extraction. None of these products provide a listing of ingredients, they just say they are "natural". I suppose that's fair in the commercial sense, but it leaves me wondering, given how loosely the term "natural" is so often interpreted these days.

Are these products safe for the bees, for us and for the environment? Fume boards are required; are these boards safe as well? How is the wax and the honey affected, if at all?

Are there other alternatives besides using the not very effective bee brush-off method?

As always, thanks for the always terrific *BC* articles and the excellent advice.

Dan Smith in SoCal

ANSWER

Great question.

Lol… I use a leaf blower.

Reply from Dan

Great idea, I should have thought of that! Not perfect, but the sprays are probably not either. I'll borrow my neighbors tiny leaf blower and give it a try. Thanks!

Reply from Ross

Jerry forwarded your fume board question to me. Chemical honey removal aids are all designed to be used in conjunction with a fume board which is roughly analogous to an outer cover with a cloth or felt covering on the underside that faces down toward the hive. The chemical is applied to the cloth/felt and the fume board is placed directly above the honey super to be harvested with the cloth side facing down. As the chemical evaporates, the fumes drop down between the honey frames and since the bees don't like the smell, they move further down toward the bottom of the hive to escape the fumes, leaving the honey super unoccupied. The honey super can then be removed from the hive, bee-free within five minutes or so, though the speed of effectiveness depends a lot on daytime temperature, humidity, and cloud cover. As you could imagine, the fume board works best on hot sunny days when chemical evaporation is at its maximum. Due to its speed and effectiveness, fume boards are used widely by commercial beekeepers.

It is my understanding that most, if not all, chemical honey removal aids on the market are acid based, often with an additional odorant added. As you noted, the term "natural" is very loosely used these days, and there is often a big difference between people's evaluations of chemical safety depending on whether one is coming from an economic, regulatory or personal perspective, so I totally understand your hesitation to use one of the commercially available chemical fumigants sold as honey removal aids.

There are various non-chemical alternative ways to separate the bees from the honey during the honey harvest. Shaking or brushing bees off

From the Editor, Jerry Hayes

individual frames and placing them immediately into a bee-proof box with a cover can work for small backyard operations. Larger operations may use a device such as a leaf blower to remove bees from honey supers. By standing honey supers up on end and forcefully blowing air between the frames, bees will be blown out the other side. This works but tends to rile the bees up as they don't like it too much.

My favorite method of separating bees from their honey at harvest time is to use a triangle bee escape board (sometimes called an escape screen). It is based upon the small plastic bee escapes designed to fit into the oval opening of an inner cover, only the escape board works faster and better than the bee escape. Without getting too detailed, when placed triangle side down facing the brood nest, the bee escape board acts as a one-way door allowing bees to travel out of the honey supers above and down to the brood area, while preventing them from moving in the other direction. It takes a fair amount of time and I often leave the boards on the hive for 24 to 48 hours (depending on night time temperatures and how many honey supers you are trying to clear bees out of) and it requires repeated trips to the beeyard, but it is gentle on the bees and no chemicals or fossil fuels are required. I don't like to use the escape board on more than two shallow or medium supers (or one deep) at a time, nor do I like to leave it on the hive for more than two days before removing the supers, due to the chance that small hive beetles or wax moths might move into the bee-free supers.

When using the blower, I think you will find it most effective to direct the air flow between the top bars. Since the bottom bars are narrower, it is easier for the bees to be blown out of the bottom of the super rather than to direct air up from the bottom and try to blow them out the top.

Reply from Dan

Thank you both for your always excellent information and advice. Your thorough explanation Ross is especially appreciated. In a couple of weeks, I'll be removing some frames for honey extraction and will use the leaf blower method suggested by you both. Depending on how that goes, I may give the triangle bee escape board a try next season. Thanks again, best regards.

INSULATING COLONIES

QUESTION

Winter is here in Vermont. I have just finished my second year as a beekeeper. First year colony died. This year I read and followed the *HBHC (Honey Bee Health Coalition) Tools for* Varroa *Management Guide*. Now I have been reading online about wrapping my colony in insulation. Is this a good idea?

Mark

ANSWER

Tough keeping honey bee colonies alive in 2023 Mark. But you endured and hung in there and whomever told you about the *Tools for* Varroa *Management Guide* deserves a big hug. You really don't need any other resource for *varroa* management decisions.

Per wrapping, let's explore what that means. In a perfect world you followed the *Tools Guide* and you have a population of semi-healthy Winter bees. I say semi because with *varroa* and the *varroa*/virus legacy nothing is perfect. But, less *varroa* is better than more *varroa*. The mostly European honey bees we manage evolved in northern Europe and figured out how to survive a long cold hard Winter. When the outside temp gets about 57°F, the bees all come together to form what we call a cluster or a mass of bees all snuggled together. The ultimate goal is to keep the only fertile female in the colony, the queen, warm and safe in the center of the cluster. So, the bees on the inside shiver and shake their muscles to produce heat. The bees on the outside surface of the colony are just an insulating layer but they do move toward the inside of the cluster and the bees on the inside of the cluster move to the outside. You have this ball of bees that is basically in constant movement as bees rotate from the outside to the inside so everybody can stay alive and keep the queen super warm in the center.

Healthy bees can do this if they have access to food, i.e. stored honey, for calories. Plus, these Winter bees have more 'fat' bodies in them for calorie insurance availability. And yes, helping the bees with wide swings in temperatures or continual low temperature in Vermont can help a colony manage overwintering. But, temperatures outside can be really cold or have warm fluctuations. So, the bees inside who are clustering and maintaining a temperature in the center of the cluster around 93°F, if in an insulated hive, it can warm up faster and hotter than an uninsulated colony. Kind of like your house. If you have all your walls and ceiling with good insulation your furnace doesn't have to run as much. But on the holidays when the oven is going and the stove top has four pots boiling and you have 20 family and friends, sometimes it gets a little too warm and you might have to crack the window. But the bees can't crack the window. They have a false sense of the real temperature and it may cause the cluster to disperse and even suggest to the queen that she starts laying. And then it gets Vermont cold out and impacts the colony and they cluster if they can change quickly and any eggs laid die. And then you have inside hive environment with moisture issues as moisture cannot get out and it collects in the hive and colony.

Hopefully I have confused you enough about what decision you want to make. We beekeepers like to do things for us, not necessarily the honey bees. But, insulating can be good or it can be not totally good. My personal opinion is healthy bees are the best. BC

FOUND IN TRANSLATION

Dog v. Machine: Identifying the Foul in Foulbrood

Jay Evans, USDA Beltsville Bee Lab

Listen along here!

American foulbrood has been a consistent, if fortunately rare, curse of beekeepers for centuries. The bacterial agent behind AFB, *Paenibacillus larvae*, is widespread in managed colonies and yet only rarely triggers symptoms in the form of decayed and highly contagious infected brood. Catching those symptomatic cases early remains a critical goal of bee health management. Many U.S. states benefit from a cadre of bee inspectors who work with beekeepers to identify and act upon AFB infections (e.g., the Apiary Inspectors of America, **https://apiaryinspectors.org/**). Our own USDA Bee Disease Diagnostics Service, led by Samuel Abban (**https://www.ars.usda.gov/northeast-area/beltsville-md-barc/beltsville-agricultural-research-center/bee-research-laboratory/docs/bee-disease-diagnosis-service/**), works collaboratively with these inspectors and individual beekeepers to pounce on suspected AFB cases before their damaging shadow increases. While the visual and culturing tools for confirming AFB infections are robust, and that smell is hard to forget, there remains a huge need to rapidly screen apiaries for early signs of infection. The frontiers for this screening are marked by an unlikely pairing of furred partners and incredibly complex machines, and it is worthwhile to see which of these tools will be the most helpful for inspectors and beekeepers.

Starting with the more charismatic tools, trained dogs are sporadically used to help inspectors pin down cases of AFB. The state of Maryland has two such trained dogs, led by Chief Apiary Inspector Cybil Preston (**https://www.earthisland.org/journal/index.php/articles/entry/detective-dog-sniffs-out-devastating-honeybee-disease/**). These companions certainly have the sensitivity to identify signals given off by diseased brood, but how accurate are dogs with the critical early-stage cases of AFB? A study by Neroli Thomson and colleagues in New Zealand aimed to push the limits of training and detection by dog detectives (Thomson, N.; Taylor, M.; Gifford, P.; Sainsbury, J.; Cross, S. (2023) *Recognition of an Odour Pattern from* Paenibacillus larvae *Spore Samples by Trained Detection Dogs. Animals*: 13, 154. **https://doi.org/10.3390/ani13010154**). Two out of three trained dogs did great, consistently and quickly responding to AFB cues placed in one spot within a twirling carousel of dog dishes (Figure). These dogs were trained using purified spores, so would presumably do great even with empty boxes containing post-AFB scale. Their sensitivity in the indoor arena was at the level of spores found in a fraction of a single infected bee. What needs to be tested is the ability of these dogs to ignore the many other smells coming from a beehive, not to mention the environmental distractions (from stinging bees to nervous beekeepers) they would experience when truly on the job.

Since it is hard to interview a dog to find out the cues they use to detect AFB, I decided to explore the most recent work involving chemical sniffers that separate AFB smells from the large and shifting bouquet that is a beehive. Jessica Bikraun from the University of Western Australia devoted her PhD thesis to this question and already has one peer-reviewed paper showing the power of a machine detective approach (Bikaun, J.M.; Bates, T.; Bollen, M.; Flematti, G.R.; Melonek, J.; Praveen, P.; Grassl, J. (2022) *Volatile biomarkers for non-invasive detection of American foulbrood, a threat to honey bee pollination services. Science of The Total Environment*, *845*, 157123, doi:**https://doi.org/10.1016/j.scitotenv.2022.157123**). Using readily available Solid phase microextraction (SPME) 'wands' as noses, she and colleagues collected air samples wafting from infected larvae in a lab-rearing setup and from larvae embedded in living colonies. Larvae sampled in the lab released 102 identifiable chemicals in the air around them. Of these, 17 were found only in larvae infected with the AFB bacterium, others were common to all bees (they also tested bees with sacbrood and bees that had been killed by freezing, along with healthy controls).

How do smells in the pristine lab setting compare to those in actual colonies? The SPME technique, while inexpensive and widely available, is compromised somewhat by the greediness of the SPME noses. If there are overwhelming smells coming from a hive, those molecules might edge out rare diagnostic signals. Field trials identified 116 volatile chemicals from beehives, 17 of which were tied to disease. In the end, only four molecules (2,5-dimethylpyrazine, acetamide, isobutyramide, and methyl 3-methyl-2-oxopentanoate) were indicative of AFB both in lab-cultured bees and in-hive air samples. These four chemicals might form the basis for an accurate and simple test. They are also themselves interesting for possible insights into the disease itself. 2,5-dimethylpyrazine is tagged an agent used by bacteria for inhibiting the growth of other microbes, something *P.* larvae does exceedingly well. While the research was focused on cues that machines can identify, the team also found candidates for smells that hygienic *bees* pick up on when scanning for diseased brood. Lactones, for example, are natural compounds found in fruits and elsewhere that are often used as components for food additives. In the airspace of beehives, lactones increased substantially with almost any form of brood stress, from AFB to sacbrood and freeze-killed brood, and the authors suggest these compounds might be another trigger for hygienic responses by nest bees. Sujin Lee and colleagues used a lab-based assay to identify and reconfirm volatile chemicals emitted by larvae suffering from AFB (Lee, S.; Lim, S.; Choi, Y.-S.; Lee, M.-l.; Kwon, H.W. (2022) *Volatile disease markers of American foulbrood-infected larvae in* Apis mellifera. *Journal of Insect Physiology, 122*, 104040, doi:**https://doi.org/10.1016/j.jinsphys.2020.104040**. They then purchased those same chemicals to test for responsiveness by worker bees. Bees reacted to several of the candidates but the authors feel that propionic acid, valeric acid, and 2-nonanone were the cleanest signals of AFB infection. Younger bees reacted more strongly to these smells than did foragers, arguably reflecting the tendency of these younger bees (middle-aged actually) to act as hygienic helpers in the colony.

Both dog noses and artificial noses were shown to be capable of identifying even low levels of AFB in field colonies. The SPME chemical nose seems to have more promise as a consistent service (inspectors could readily collect smells from hives with a SPME wand and then send that wand to an analytical lab) but it would not give the in-the-moment diagnostic provided by dogs and good inspectors. For now, those live inspectors are earning their kibble by advising beekeepers when a problem is likely. BC

A Season of Reflection

John Miller

It's November. For many, this is a season of thanksgiving, reflection, applying lessons learned in 2023. The business guru, Steven Covey published his *7 Habits of Highly Successful People*, 30 years ago. One of the statements in that book repeatedly impresses me: "Lessons are repeated until they are learned."

This year, many beekeepers, but not all beekeepers, harvested a good honey crop.

Here are a few observed lessons from 2023. The supply of #1 Dakota Clover honey is finite; it always is. The supply of really good bees for pollination work is finite; it always is. The supply of time to do good hive health practices is finite; it always is. The supply of financial support for causes we believe in is not infinite; but neither is it finite.

What do I mean by that infinite/finite remark? We all support causes of one kind or another.

We support our local fire protection district and ambulance service. Likewise, many of us support charitable organizations, frequently anonymously. If you are of a certain age, you likely support a grand-child's 529 Education Fund; or a new trend among oldsters is to establish Roth-IRA's for students in middle school. (WSJ September 9, 2023 – *The Secret to Saving for Retirement: Start Before You're 20* by Ashlea Ebeling) The story features an 11-year old beekeeper whose parent started a Roth IRA in part with the earnings from keeping her five beehives and sales of locally packed, labeled and bicycle-delivered honey to willing customers.

Every now and then we learn that an admired beekeeping industry leader lived an impressively generous life. It's appropriate to recognize Joe M. Traynor, of Bakersfield, CA. Joe started his business, Scientific Ag Co. in 1973. Over many years of bee brokering, consultations, and service to both beekeeper and almond grower alike, Joe Traynor stood for integrity, and giving back. Joe originated and practiced the idea of matching a dollar for dollar donation to Project Apis m. (PAm), a bee research non-profit. Joe was a founding member of PAm.

I was an Alternate Board Member on PAm while Joe led by example – funding work to control *Varroa destructor*. I listened in as PAm found its legs and earned legitimacy in the beekeeping and almond industry. Later, I became Secretary/Treasurer for PAm. It is a fulfilling job. I wish we had more Joe Traynor's. Would it surprise you to learn that Joe Traynor donated well over a half-million dollars to Project Apis m.? Over $500,000 in donations to support hive health and bee research. In this industry, that is a pile of money.

In November, the California State Beekeepers Association (CSBA) will honor Joe M. Traynor. I'm not sure how the program will honor Joe. We meet in Costa Mesa, Orange County at the Hilton. See the CSBA web site for details (**californiastatebeekeepers.com**). I called several of my friends, asking if they would, while attending CSBA, make a donation memorializing Joe Traynor. No one declined; all volunteered a $1,000 memorial donation to PAm. Some will probably do more; maybe a lot more. If 100 attendees make $1,000 donations it will be a good start – but nowhere near match Joe's generosity to our industry.

In 2013, I was President of CSBA. My program included Dr. A. Gary Shilling, an economist and beekeeper from New Jersey. He also is a generous supporter of PAm, and a Board Member. I tasked Joe Traynor with hosting Dr. Shilling at the South Lake Tahoe meeting. These two industry leaders, with close educational ties (Joe went to Berkeley, while Dr. Shilling attended Stanford) but somewhat differing world views – I knew Dr. Shilling would be in good hands with Joe. Thanks, Joe.

It's November. A season of reflection. American beekeeping seems to be lurching – perpetually from one crisis to another. If it isn't lack of pasture, it's parasites. If it isn't pathogens, it's prices for honey – and prices of everything else! I can without hesitation state that beekeeping in North America is better because of bee research funded and published by PAm (the web site archives all our research). I am certain PAm will be central to the prevention of *Tropilaelaps mercedesae* from North America for as long as possible.

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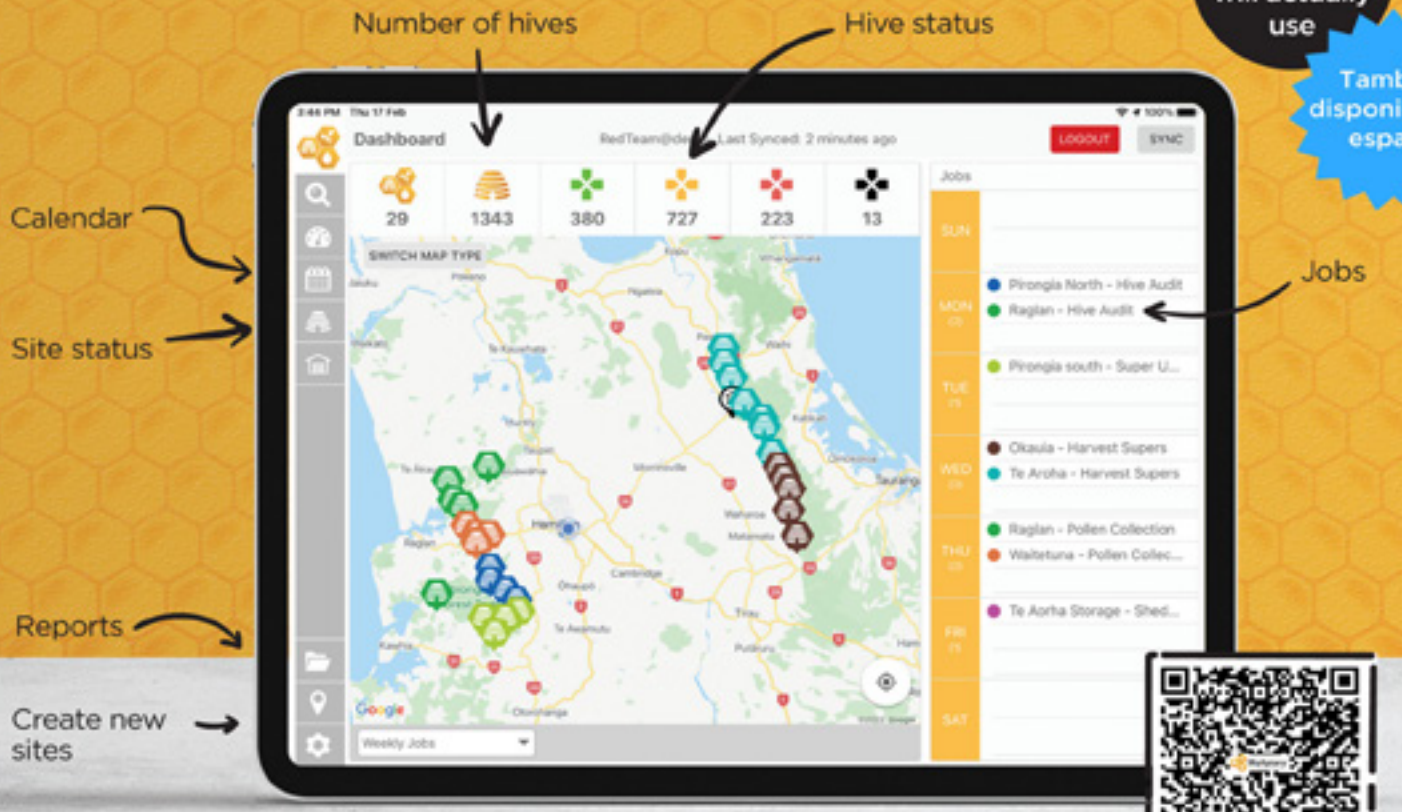

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A Closer LOOK

Queen Banks

Clarence Collison

Queen banking is the storage of queens individually in cages and placed in a colony to be cared for by worker bees. Northern California queen producers bank excess queens as seasonal demand subsides in the Summer to provide an on-demand supply to beekeepers. This study investigated the potential to bank honey bee queens indoors as an effective system during the Summer. This research compared current Summer outdoor queen banking practices in northern California with banking in indoor temperature-controlled storage facilities. Treatments were separated into three groups: indoor queen banks, outdoor queen banks and a set of unbanked control queens. Three different stocking rates were tested (50, 100 and 198 queens per bank). Queen quality parameters and survival data were assessed using laboratory and field assessment methods. There was no significant difference in queen quality parameters apart from the weight of indoor queens banked at the rate of 100, which were significantly lower than the other banking rates. There was a significant difference in the survival of different stocking rates. Queens banked indoors at a rate of 100 were more likely to survive than other stocking rates, both indoor and outdoor. Queens banked outdoors at the rate of 198 were more likely to survive than other outdoor banking rates. Queens stored indoors had a significantly higher survival of 78 ± 1% than queens stored outdoors with a survival of 62 ± 3%. Indoor banking performed better in quality and survival as compared to outdoor queen banking. Therefore, indoor queen banking has the potential to mitigate increased risk to the valuable Fall queen supply caused by rising, hot, Summer temperatures (Onayemi, 2021; Webb et al., 2023).

The mass storage of mated honey bee queens in reservoir colonies over the Winter was investigated under continental climatic conditions. The mated queens were stored in (a) queenright reservoir (QRR) colonies on a frame with partitioned honeycomb, (b) QRR colonies on frame holding wire screen cages, (c) queenless reservoir (QLR) colonies on frame with partitioned honeycomb and (d) QLR colonies on frame holding wire screen cages. In addition to mass storage, the queens were individually wintered in colonies held in Kirchainer mating hives and in five frame nucleus hives with standard combs as the control group. The queen survival in reservoir colonies was observed from October 2000 to March 2001. No queen survived the Winter in QRR colonies, whereas 16.7% of the queens stored in screen cages and 40.5% of the queens on honeycomb in QLR colonies survived for five months. The queen survival in mating hives and in five frame nucleus hives was 80.0% and 83.3%, respectively. Reproductive performances of surviving queens overwintered in reservoir colonies, mating hives and five frame nucleus hives were evaluated by comparing brood areas and adult bee populations produced in test colonies. There were no differences in numbers of frames of bees and in brood production of queens in test colonies. Thus, mass storage of queens over the Winter did not impair their reproductive performance (Gencer, 2003).

Productivity of honey bee queens in Canada, as measured by area of sealed worker brood and net weight of colonies, was generally higher with queens overwintered in two frame nuclei, than with queens overwintered in a group. Poor acceptance and supersedure of group overwintered queens suggest that this method of storage is not yet acceptable for commercial use. Survival of the nucleus queens was low in outdoor two frame units during the Winter but improved with an indoor system. Overwintering queens indoors in two frame nuclei and outdoors in three to five frame nuclei with supplemental feeding of carbohydrate in late Winter should provide a source of queens which could partially fulfill market demands in the Spring (Mitchell et al., 1985).

Spring imports of queen honey bees are essential to replace Winter colony losses in Canada, but contribute to the spread of treatment-resistant strains of pathogens and undesirable genetic traits. A possible alternative to these imports is the mass storage of queens during Winter. By overwintering a strong colony (queen bank) containing large numbers of mated queens isolated in cages, beekeepers could acquire local queens early in the Spring. In this study, the efficacy of overwintering queen banks at two different queen densities (40 and 80) was tested. In the 40-queen banks (40 QB), 74.2% of queens survived the six month overwintering period, while 42.1% of queens survived in the 80-queen banks (80 QB). When compared to queens overwintered free in their colony, queens from bank colonies were smaller and lighter in early Spring but had similar sperm viability and sperm count. Overwintering queens in banks did not have

Queen cages arranged in a holding frame side to side with wire netting opening for nurse bees to feed queens. Photo from http://dx.doi.org/10.1080/00218839.2023.2165747, used with permission.

an impact on their acceptance in a nucleus colony but reduced their oviposition in the initial weeks following their introduction. After several days in nucleus colonies, queens from banks had regained a size and weight similar to that of queens overwintered normally, suggesting that they could perform well over a complete beekeeping season (Levesque et al., 2023).

The production of young, mated queens is essential to replace dead queens or to start new colonies after wintering. Mass storage of mated queens during Winter and their use the following Spring is an interesting strategy that could help fulfill this need. In this study, the survival, fertility and fecundity of young, mated queens stored massively in queenless colonies from September to April (eight months) was investigated. The queens were kept in environmentally controlled rooms at temperatures above and below cluster formation. The results show that indoor mass storage of mated queens can be achieved with success when queen banks are stored above cluster temperature. A significantly higher survival of queens was measured when wintering queen banks at 16°C (60.8°F). Surviving queens wintered at different temperatures above or below cluster formation had similar fertility (sperm viability) and fecundity (egg laying and viable worker population). This study shows the potential of indoor overwintering of honey bee queen banks. This technique could be applied on a commercial scale by beekeepers and queen breeders (Rousseau and Giovenazzo, 2021).

The effect of storage cage level (upper or lower) and its position (peripheral or middle positions) on weight, survival rate and egg laying capacity of queens stored in queenright colonies for various storage periods was studied. Storing mated queens in this way had a significant effect on their weight after 75 days of storage. The means of queen weight were 174.9 and 167.4mg for the upper and lower strips, respectively showing the superiority of the upper one. A significant increase in the mean weight of queens stored in the middle position (172.5mg) was noticed comparing to peripheral ones (169.8mg). All the stored queens had significantly greater weight than their original weight before storage during the different periods of experiment. There were significant differences in the survival rate of mated queens stored in different levels, as the mean survival rate of queens stored in the upper strip (69.3%) was higher than the survival rate of mated queens stored in the lower one (60.1%). The queens stored in middle position attained a significantly higher survival rate (70.7%), than those stored in peripheral ones (58.7%). The overall survival rate was negatively influenced with the increase of storage period. In respect of egg laying capacity measured as sealed worker brood area, queens stored for 45 days produced a significantly larger sealed brood area (875.5cm^2) than that produced by queens stored for 75 days (843.2cm^2) (Al-Fattah et al., 2016).

Mass storage of queens over the Winter was investigated in colony banks, with each queen held in her own cage within a colony. The major treatments included: (I) a single queen wintered in a small nucleus colony (control); and colony banks with 24 or 48 queens, each held individually in (II) screen cages that prevented workers from entering the cage, but allowed access for queen tending, (III) queen-excluder cages (queen-excluder material has openings of about 55mm that prevent the larger queen

but not the smaller workers from passing through the material), or (IV) screen cages until January and subsequent transfer to mini-nuclei until late March. Queens held in excluder cages showed poor survival in all three years of testing, and this system was not viable for commercial use; survival for any one year, or any excluder treatment, was never greater than 25%. In contrast, a two year average of 60% queen survival was found for queens that were stored in individual screened wooden cages within queenless colony banks. No differences in survival of banked queens that were moved between colonies monthly and those that remained in the same colony for six months was found. The success of these systems required the (*a*) preparation of colony banks that contained large numbers of adult workers produced by maintaining colonies with two queens during the previous Summer, (*b*) removal of laying queen(s) during the storage period, (*c*) feeding of colonies well and (*d*) insulation of colonies in groups of four, to preserve heat and reduce worker clustering in the Winter. Surviving queens from Winter storage systems were virtually identical in quality and colony performance to control queens the subsequent season (Wyborn et al., 1993).

This Egyptian study aimed to investigate some factors affecting stored mated queens' weight and survival rate as well as post storage performance of these queens after 75 days of storage within queenright colonies. Storing queens in numbers of 20, 30 and 40 had no significant effect on their weight. Mean weight of queen stored in excluder cages (EC) was significantly higher than those stored in screen mesh ones (SC). The mean weight of stored queens in the upper strip was higher than the mean of the lower one. Queens stored in peripheral and middle of a holding frame did not differ significantly from each other. Concerning the queens' survival rate, the mean survival rate of 20 stored mated queens was the superior rank, while the survival rate of 30 and 40 stored mated queens came next with no significant differences between them. Queens stored in SC had more significant survival rate than those stored in EC. The upper strip had a higher survival rate than the lower one. Queens stored in the middle of a holding frame showed significantly higher survival rate than those in the peripheral. Regarding post storage performance, no significant differences were detected between the brood areas produced by queens stored for 45 or 75 days in the three densities. Queens stored for 45 days and those in the upper level had a significantly higher brood production than those stored for 75 days and those stored in the lower level. Queens stored for 45 and 75 days had no significant differences in supersedure percentages either stored in the three densities, in two levels or in the two positions. The second part of the study involved the storing of virgin queens. This work was aimed to investigate the effect of colony and storage cage type on queens' survival rate, orphan period on attracted workers as well as storage period and colony strength on queens attractiveness and acceptance. Queens stored in Benton cages (BC) had a higher insignificant survival rate than those stored in emerging ones (EMC). Storing queens in queenless colonies resulted in a more significant survival rate than those stored in queenright ones. Increasing the colonies orphan period attracted more significant workers to old queens. This attractiveness increased significantly with the increase of queen age from three to 30 days old. The younger and older virgin queens were significantly more accepted than the intermediate ones. The average number of attracted workers in nuclei was significantly greater than those recorded in strong colonies and so as the acceptance percentages (El-Din, 2016).

The survival of caged newly-emerged virgin queens every day for seven days in an experiment that simultaneously investigated three factors: queen cage type (wooden three-hole or plastic), attendant workers (present or absent) and food type (sugar candy, honey or both) was studied. Ten queens were tested in each of the 12 combinations. Queens were reared using standard beekeeping methods (Doolittle/grafting) and emerged from their cells into vials held in an incubator at 34°C (93.2°F). All 12 combinations gave high survival (90 or 100%) for three days but only one method (wooden cage, with attendants, honey) gave 100% survival to day seven. Factors affecting queen survival were analyzed. Across all combinations, attendant bees significantly increased survival (18% vs. 53%, $p<0.001$). In addition, there was an interaction between food type and cage type ($p<0.001$) with the honey and plastic cage combination giving reduced survival. An additional group of queens was reared and held for seven days using the best method, and then directly introduced using smoke into queenless nucleus colonies that had been dequeened five days previously. Acceptance was high (80%, 8/10) showing that this combination is also suitable for preparing queens for introduction into colonies. Having a simple method for keeping newly-emerged virgin queens alive in cages for one week and acceptable for introduction into queenless colonies will be useful in honey bee breeding. In particular, it facilitates the screening of many queens for genetic or phenotypic characteristics when only a small proportion meets the desired criteria. These can then be introduced into queenless hives for natural mating or insemination, both of which take place when queens are one week old (Bigio et al., 2012).

Even though there are some beneficial aspects of banking queens, there can also be some negative effects on the stored queens. Most of the queen banking techniques involve caging queens in various types of cages. Zajdel et al. (2020) reported that queens stored in "queen banks" suffer primarily from leg injuries after they reviewed numerous studies. Queen injuries associated with caging include: 1) changes in the color of the arolia (pad-like lobes projecting between the tarsal claws), 2) missing leg segments or missing whole legs, 3) arolium deformation and partial or complete loss of arolia and claws and 4) frayed wings and loss of antennae or antennal segments. Leg paralysis, probably resulting from stings, has also been reported. These injuries influence the queen's motor and sensory abilities and disqualify them as high-quality queens. Even a small number of queens stored in one colony are exposed to injuries from worker bees. Injuries to queens were observed regardless of the age of the workers attending to them and the presence of brood in the bee colony. BC

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I'd Rather be Beekeeping

Stephen Bishop

I hate to admit this because it will probably further deteriorate my masculine reputation, but I've played a video game or two in my day. I grew up in the golden era of video games, with SEGAs and Super Nintendos and Playstations and Gameboys and PC games—and parents who were blissfully unaware of the great societal evils supposedly lurking in those games. All I know is that, evil or not, those cartoonish big bads at the end of each level were quite fun to battle, and many took all my button-pushing skills and strength to defeat (I'm looking at you, Bowser.)

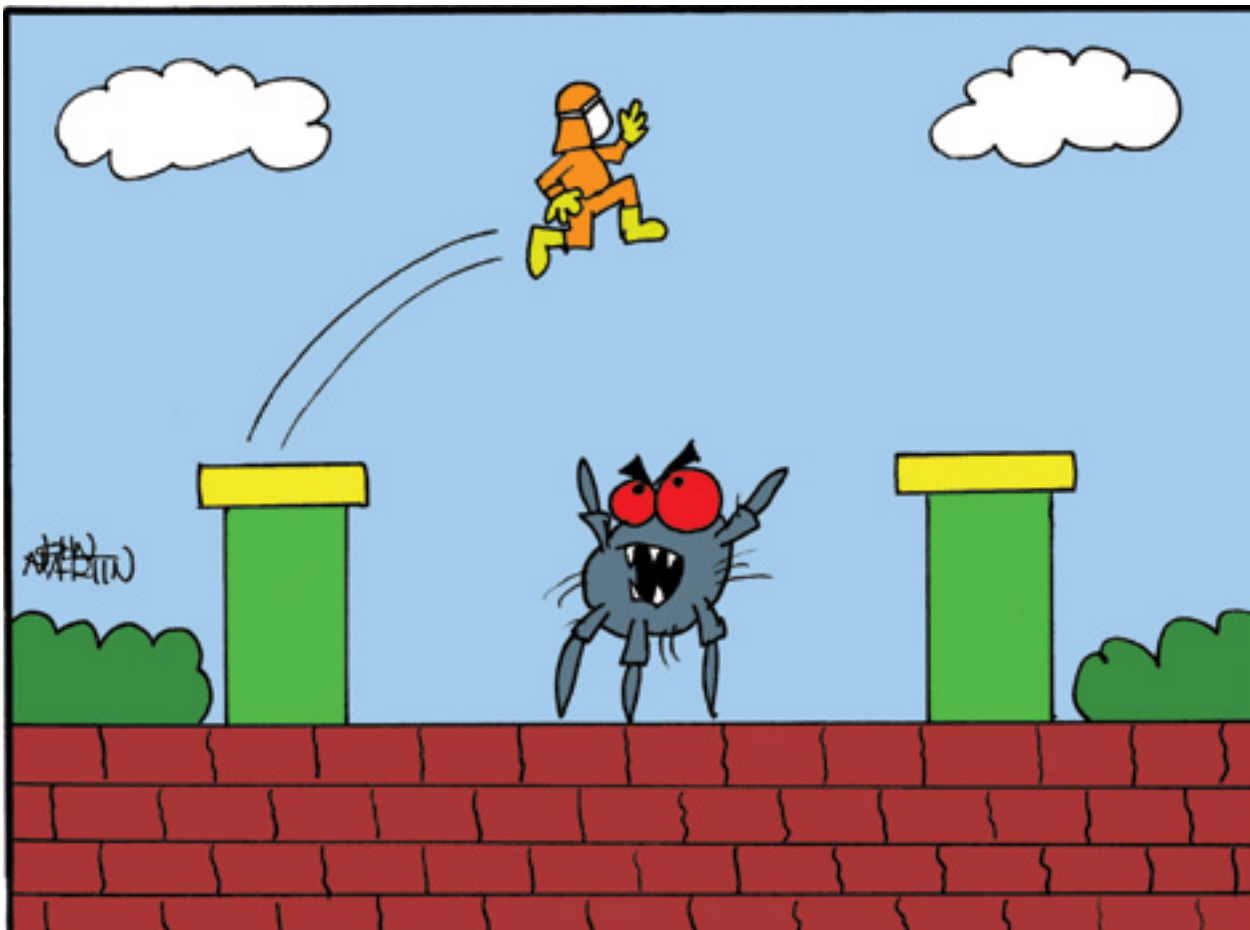
Still, some of my favorite video games weren't your normal run and jump games like Super Mario Brothers or Sonic the Hedgehog; they were strategy and RPGs (role playing games), like Civilization, SimCity, and Final Fantasy. The premise behind a lot of strategy and RPG games is that you must plan ahead and slowly build up abilities and skills to complete your objective.

Now, as I look back on my video-game-playing youth nostalgically, I must admit these strategy and RPG games were, well, highly addictive. You can easily make a case that video games were just another form of art imitating life, especially since video game developers were purposefully simulating and stimulating our natural desire for rewards—a.k.a leveling up—to keep people playing and to sell more games.

Anyway, the point of all this video game babble is that for someone like me who has dabbled once or twice in the virtual worlds of gaming, I see a lot of similarities in the real world of beekeeping. Beekeeping has real life versions of cartoonish big bads—wax moths, small hive beetles, and the biggest big bad of all, the tiny *varroa* mite. And the strategy of planning out your beekeeping calendar and path, the mastery of new skills and beekeeping abilities, the challenging new levels to attain each year as you expand your apiaries, and the resulting obsession (if not addiction)—it all seems very familiar.

Take it with a grain of salt since I'm not a healthcare professional, but I suspect that beekeeping can indeed be addictive, but hopefully addictive in the best way. William Glasser, the well-known psychiatrist and prolific writer, believed that positive addictions did indeed exist, stating,"A positive addiction can be anything at all that a person chooses to do as long as it fulfills the following six criteria: (1) It is something non-competitive that you choose to do and you can devote an hour (approximately) a day to it, (2) It is possible for you to do it easily and it doesn't take a great deal of mental effort to do it well, (3) You can do it alone or rarely with others but it does not depend upon others to do it, (4) You believe that it has some value (physical, mental, or spiritual) for you, (5) You believe that if you persist at it you will improve, but this is completely subjective—you need to be the only one who measures that improvement, (6) The activity must have the quality that you can do it without criticizing yourself. If you can't accept yourself during this time the activity will not be addicting."

For me, beekeeping checks a lot of these boxes, and looking back, I guess the big difference between video games and beekeeping is number six. With video games, I sometimes felt a lingering feeling of guilt attached to that activity, the feeling that I could be doing something better with my time. I've rarely had that feeling with beekeeping. In fact, most of the time, there are few things I'd rather be doing than beekeeping. BC



Petro Prokopovych: Father of the Modern Hive

John Gordon Sennett

"Assigning myself to one branch of agriculture—beekeeping, I devoted my whole life, all my thoughts, all my attention to it." — Petro Ivanovych Prokopovych

Ukraine is a beekeeping nation and so it is apt that the Father of the Hive hails from there. Petro Prokopovych is recognized worldwide as the founder of commercial beekeeping and inventor of the first moveable hive frame (Prokopovych called these frames sleeves). The wide adoption and commercialization of the Langstroth Hive via U.S. Patent Number 9300 on October 5, 1852 drove Prokopovych's Hive into obscurity, or did it? A brief history sketch is needed to understand how long beekeeping has been practiced here.

Ukraine began as a nation under the name Kyivan Rus whose lands stretched from the Baltic Sea down to the Black Sea. Kyivan Rus was a regional power from the ninth to the 12th century and its influence rose mainly due to its strategic location for trade and defense on the banks of the Dnipro River. Two of Kyivan Rus's top commodities for trade were honey and beeswax. Kyiv's entire history is aligned with that of honey and beeswax. In Ukrainian, the word for honey is "Med" and it is assumed that the drink that the Vikings and many others loved so much, mead, is derived from that Old Slavonic word. Yaroslav the Wise (11th century) developed a system of law and codes which became known as Pravda of Yaroslav (Truth of Yaroslav)[1]. Bees are mentioned in at least seven chapters of this ancient code of law. Many monasteries in Kyivan Rus including the Kyiv Pecehersk Lavra (founded 1051 A.D.) also have their own apiaries. Beekeeping has consistently been practiced on the grounds of the Kyiv Pechersk Lavra for nine hundred and seventy-two years. Truly, Ukraine is a nation partially founded on beekeeping.

Petro Prokopovych was born in Mytchenky, a small village in Northern Ukraine (a region that now directly borders Russia) on June 29, 1775 about the time that U.S. colonies were preparing for the Revolutionary War. His father was an Orthodox priest of Cossack origin. One must understand that the Cossacks considered themselves free men and were not part of the serf system under the ruling Russian Empire. Serfs in Russia were much like slaves in the U.S. in that they could be bought, sold and traded. Cossacks were military men for the most part and often served in the armies of Russia due to their unique fighting and organizational abilities. Petro Prokopovych first attended the Kyiv-Mohyla Academy (established 1615 as an Orthodox Christian School of Theology). Students from all over Eastern Europe and Greece attended the academy. Here, Petro learned French, German, Greek, Latin and Russian. Upon graduation, there were not many opportunities for the graduates due to a rampant campaign of Russification under Empress Catherine.

Cossacks almost always turned to military duty when other opportunities did not exist and thus this is what Petro did under the guidance of his parents. Petro entered the Pereyslav Regiment (originally formed by Ukrainian Hetman but now under Russian rule) and graduated within two years from their military school. He participated in the construction of Odesa and its port before his regiment was sent to quell the Warsaw Uprising (1794) under Count (General) Alexander Suvorov. General Suvorov had allowed his troops to plunder and loot Warsaw upon their success. Petro was a peace and nature loving person so this brutality had to have affected him, but he was promoted to the rank of lieutenant. In 1798, Petro resigned from the military and tried to return home. His father was not willing to allow him to stay because he considered it an embarrassment that his son had resigned from such a successful military career. This is the event that led Petro to beekeeping.

Petro went to stay with his younger brother who had a small apiary in 1799, not far from his native home. He spent that year studying the bees and their behavior. The following year, he purchased a small plot of land with 37 beehives. His first year started well but ended in tragedy when his farm burned down destroying some of the beehives. Discouraged but not deterred, he spent the following year digging log dugouts for the bees. Log hives were the most common way of keeping bees in those times and in some places in Ukraine and Belarus, this practice is still adhered to. In another eight years, his apiary totaled 580 beehives. No literature on beekeeping satisfied Petro, especially when it came to queens. His knowledge was already gaining

[1]The full text of the code in English can be read here: **https://web.archive.org/web/20220217103027/http://web.grinnell.edu/individuals/kaiser/exrp.html**

respect as in his ninth year the Moscow *Zemledelchesskaya Gazette* wrote, "Mr. Prokopovych, we can say, is the only connoisseur of bees in our time, not only in our country, but even in the whole of Europe, whose remarks and sayings about these insects have no equal in terms of completeness, simplicity and truthfulness. Yet, in the West, Prokopovych is barely even referred to despite having written over 70 articles in various European languages.

For seven years, Petro Prokopovych worked on designs for beehives that were more friendly to the bees as he was troubled within his soul with having to destroy the bees for their honey. Finally, in 1814, his design was complete, and thus the Prokopovych Hive was introduced. This was the first moveable frame hive designed and used worldwide. Petro called his frames "sleeves" when he introduced the invention. Simultaneously, Petro also designed the first Queen Excluder which was placed in his new invention. A. I. Root himself praised Prokopvych's hive stating, "His shop frame has much in common with the modern sectional frame with cutouts for the passage of bees, the walls of his hive are tied in a lock. He used methods that were far ahead of his time. Some beekeepers believed that Jeron invented the movable frame (Germany) in 1845, but, without a doubt, the latter had no right to this glory."

Petro Prokopovych, generous soul that he was, opened the first beekeeping school in Ukraine (then under the Russian Empire) in 1827 in his native village of Mytchenko. School lasted for two years with practical knowledge in the first year to include tools, carpentry, reading, writing and the honey bee life cycle. In the second year, students practiced hands-on beekeeping. Most of the pupils were serfs from Ukraine, Belarus, Bashkiria and Georgia as well as foreign students from Germany, Poland, Italy and Czechoslavkia. Students studied in groups in their own native language. Prokopovych insisted on spiritual education and students were held to a Christian moral code by taking an oath. He sought to make good people out of his students to include respect for nature, man and God. Petro used the Joseph Lancaster Method of Education (Monitorial System) with its motto being, "He who teaches, learns." Top students were responsible for teaching their fellow students. The school operated successfully for 53 years and graduated over 700 students.

Petro's students clearly disseminated the information they learned from him as they returned to their home countries. John S. Harbison's innovative "California Hive" built in 1857-1858 basically resembles Prokopovych's Hive with the exception of the top frames built for honeycomb. Lorenzo Langstroth surely must have been familiar with the Prokopovych Hive even though he is credited with "bee space", maybe he is just credited with the naming of it. Prokopovych surely understood bee space based on the spacing of the sleeves (frames) in his hive. A thorough examination of Prokopovych's writings that still exist would have to be explored. Both Harbison and Langstroth were from Philadelphia

which had a large German speaking population. Thus, it is possible that Prokopovych's students or knowledge traveled the Atlantic and his expertise found its way to them.

Prokopovych died at 75 years of age in 1850, just as American beekeeping was becoming more industrialized. In Ukraine, they call Prokopvych the father of "rational beekeeping". He is well revered with several museums, institutes and memorials dedicated to his legacy. Petro's son named Stepan Velykdan increased Prokopovych's apiary to be the largest in Europe with allegedly over 12,000 beehives. Petro had married a peasant woman (Borovyk) and was not allowed to pass his surname to Stepan because of Russian Imperial laws. Stepan was proud of the Ukrainian heritage his father had passed to him including keeping and maintaining the Ukrainian language. The great poet of Ukraine, Taras Shevchenko, is said to have visited Petro and may even have based characters in his story "The Twins" on that meeting. Here in Ukraine, his legacy lives on as does the beekeeping industry that keeps this nation's rural and urban economy rolling while at war. In Slovenia, the beehives in the bee houses look like a modified Prokopovych Hive. So, now when you think of Ukraine, don't think so much about war but what this nation's people and its impact on the hobby and business of beekeeping. Please remember this humble and kind man, Petro Prokopovych, and his contribution to an ancient form of husbandry that so many of us know and love.

"...So that the most intelligent people by nature, who differ from others in kindness, intelligence, diligence, perseverance and natural inclination to bees, were chosen for the supervisor of bee farms. The choice of such human qualities is very difficult, but it depends on God all further success." —Petro Prokopovych BC

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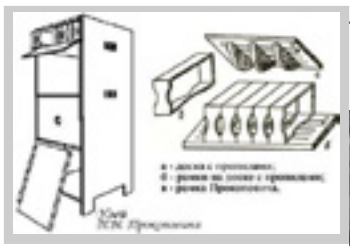

Translation
a – Board with slats
b – frames on board with slats
B – Prokopovych frames

AM I A COOK OR A CHEF?

James Masucci

Recently, I was reminded once again that I think differently about beekeeping than most people in my bee club. I recently brought in a speaker that changed the way I think about beekeeping. I love hearing him speak and even more so, talking to him in person. Yet, many people in the club didn't get what he was telling them. They didn't make the connection for using his data in their own bee management. Being a science geek, I love seeing data, especially the kind that allows me to ask the questions, "How can I use that in my own operation?" or "How does that pertain to my situation?" The speaker's data have been used by both Randy Oliver and Ian Steppler (two influential beekeepers) to explain why they manage their bees the way they do. These guys are chefs. They don't do anything without a reason and they think hard about what is needed and why before they act.

How does this differ from most beekeepers? Most beekeepers act as cooks. They are concerned with what they need to do. This is more prevalent in younger beekeepers. They want a recipe to follow. At that same meeting , another speaker talked about how to do mite counts. He proceeded to give a very nice presentation on just that… providing a recipe to everyone in attendance. Most people in the room thought that was the perfect talk, which makes sense since the bulk of our membership are beekeepers with less than five years of experience.

Cooks follow recipes and chefs develop recipes. This is not a judgement. Many cooks produce better food than many chefs. It's the way they think about the process that differs. All beekeepers have a system. We all act as cooks… MOST of the time. It's when you try to improve your system, or something new occurs, that you need to act like a chef. To do that, you need to truly understand your system.

I have a personal example of this, that also shows just what a neophyte I am. I had the opportunity to purchase a couple hundred "recycled" queens from a CA queen producer for a very good price. So, I received 200 queens in mid-June. I now had the problem of making splits in the middle of the nectar flow without impacting my honey yields. After several days of mulling this over, I came up with a plan to run double queen colonies using two excluders and a spacer. All the bees would work the supers together and both queens would be supporting their own colonies. Pretty good, right?

Fortunately, I am smart enough to know how dumb I can be, so I called a commercial friend of mine who makes splits all the time. He told me in his South Georgian drawl, "Jim, if it were me, I'd take a couple frames of brood from each hive and place the split about 10 feet from the hive. The foragers will return to the production hive and the split will take off with the new queen." Genius in its simplicity, but it takes a solid understanding of hive population dynamics to come up with it. Only the older bees forage for honey. So, removing nurse bees and brood won't impact honey collection at all. In fact, it requires a lot of resources to raise brood and removing that drain of resources might actually increase honey yields. It worked like a charm. Most of the splits were successful as were my honey yields.

I brought this situation to myself. Problems like this don't arise for the normal beekeeper. And the old adage, "if it ain't broke, don't fix it" certainly applies to most successful beekeepers. But there are beekeepers like me who are expanding and trying to do things that most beekeepers aren't concerned with. We need to find efficient ways of bee management. We need to hear about the nitty gritty in the hive. We need to understand the dynamics of the hive to make new recipes for our bees. The transition from hobbyist to sideliner/commercial comes with a rather steep learning curve. But we are also in the minority of beekeepers. The thing is, the answers to some of our problems can also be used by the average beekeeper.

For example, the next logical step in my Summer split scenario is to ask the question, "How late can I still make splits?" Hence, I brought in the speaker I told you about, to talk about the formation of the Winter cluster. I need to understand how and when the Winter cluster forms in order to make a reasonable decision in my area. Although most beekeepers aren't making late Summer splits, there is a corollary to this question that pertains to everyone. How late in the year can I requeen? I get several phone calls in late Summer asking for queens or nucs because their colonies are failing. Most of the customers have no way of deciding if the colony is already dead or is worth the investment to try and save. At the same time, I have to decide if it is worth pulling a queen from one of my nucs that I hope to overwinter. How late can I still generate a queen?

We as beekeepers need to understand that we have both cooks and chefs in our ranks. One is not better than the other, but the way they think and the information they want is different. A club with diversity of thought and action is much stronger than one that caters only to one. The trick, however, is to find the balance so all beekeepers' needs are met. BC

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Book Review
Raising Resilient Bees

Dewey M. Caron

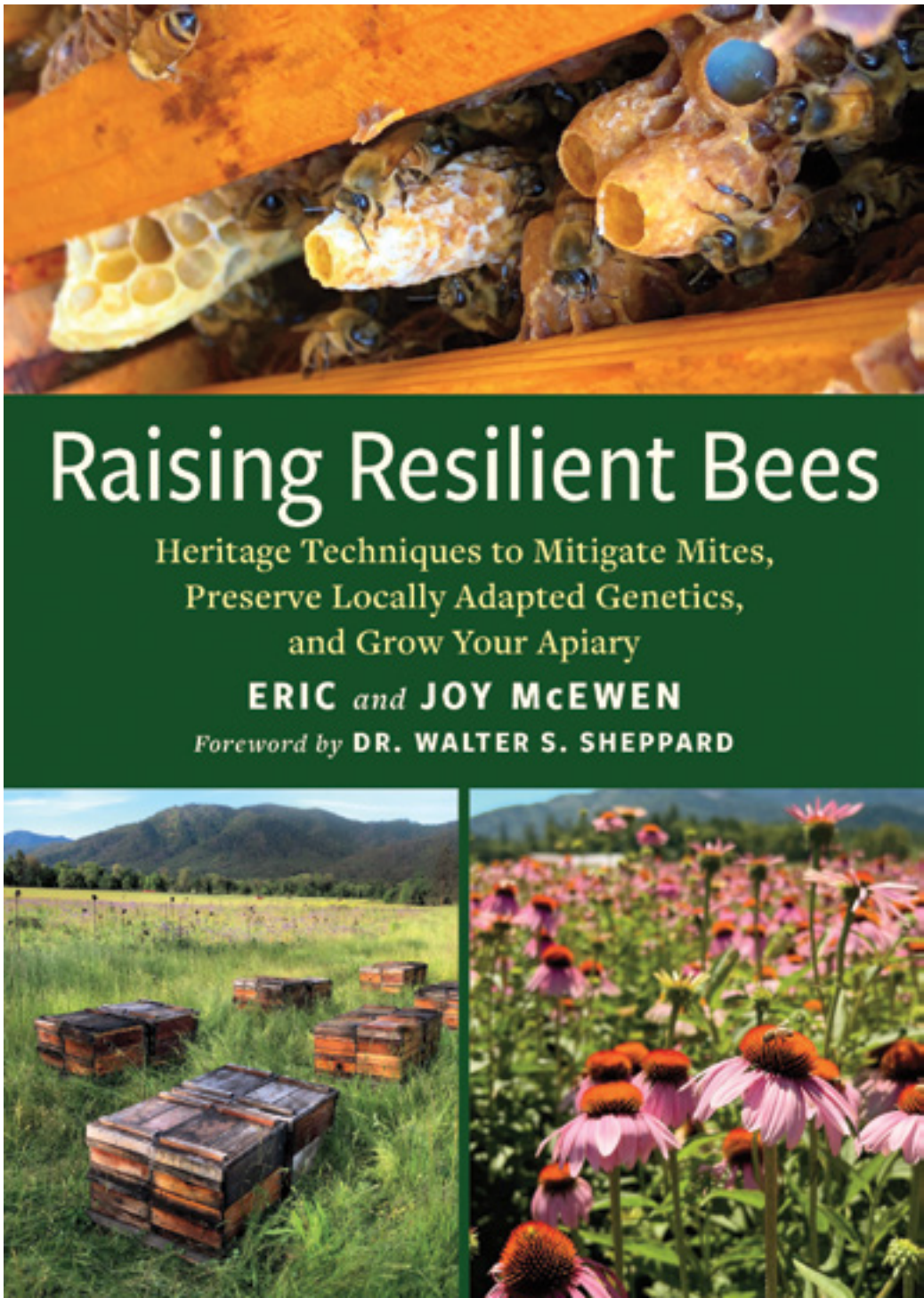
Eric and Joy McEwen live on a 35 acre farm in a relatively remote valley of SW Oregon close to the California border. Their isolation figures prominently in their new book *Raising Resilient Bees Heritage Techniques to Mitigate Mites, Preserve Locally Adapted Genetics and Grow Your Apiary*. Their two beekeeping goals, to develop a more resilient honey bee population and to practice a functional organic farm and apiary management, are explored in this delightful, well written new bee book.

The McEwens' on their Diggin' Livin' Farm and Apiaries have two decades of organic hive (and farm) management. As suburban transplants from the Midwest, they profess to "learning the hard way." They make it clear their journey key has been to benefit and learn from the mistakes. They call their 24 year beekeeping journey a "process of failure and adaptation". Their *Raising* book is a practical manual with numerous recommendations for improving beekeeping success, all based on their real-life experiences.

What do they mean by resilient? They use the term throughout the book. In the book's conclusion, the McEwens' define resilience as "more than perseverance… it is perseverance in accord with natural truths, resulting in a strength supported by that natural foundation and pillars of effort, courage and intentions." They state that success was to find new solutions to old problems.

Eric and Joy McEwen were trained in organic farming and permaculture. Dr. Debbie Delaney, then an Oregon State University graduate student, gave them their first bee hive. When they moved to their present farm, they jumped right in with nucs from commercial beekeepers Kenny and Heike Williams. The first season yielded some honey to harvest but also produced a heavy loss the first Winter due to *varroa* mites. That Winter was followed by others of continued losses as they tried various means of controlling *varroa*.

Their initial chapter, *A New Apiary for a New Age*, lays out their philosophy of beekeeping. They summarize here, and in other chapters, their use of the term resilient. Summarizing on Page 31 they state: "Every agricultural endeavor requires failure and experimentation… learn from this recounting of our successes and failures to expedite your journey toward new levels of stability and productivity. Management tools and practices we advocate are in line with organic and biodynamic tenants… [that] will contribute to the health of land, the revitalization or improvement of which is ultimately required for truly resilient and productive apiaries… Even in the midst of pressure from *varroa* mites and environmental upheaval, a land-based matrix of regenerative farms intermeshed with



functioning natural systems will maintain the requisite resilience to support natural life forms."

In Chapter 2, *The Tenets of Natural Nest Beekeeping* and continuing to Chapter 3, *Hive and Apiary Design*, the McEwens' emphasize that to do nothing is not a solution. Natural nest beekeeping, proper, judicious use of the smoker, siting colonies to benefit the bees and maintaining movable comb Langstroth (eight frame) homebuilt hives is their reasoned system for success. Their management ideal is to support the bees in a holistic fashion while keeping mites below destructive levels.

There are chapters on the genetics of resistance, successful pest and disease control with an IPM approach, qualities of successful queens and how to make stock selections, and seasonal management. All are told in a very easy reading conversational style. You might imagine sitting down with them to share their two decades of beekeeping experiences. Maybe even share one of Joy's Jun beverages! You will want to continue reading *Raising Resilient Bees* and have a hard time putting the book down once you start.

You will surely enjoy their last chapter, Chapter 7, *Makin' a Livin'*. As small scale commercial beekeepers, they have sought to integrate their bees into their farm management. One serves the other. Bees provide essential service to their environment and the environmental improvement feeds the bees. They have made value-added farm goods as wholesalers, retailers and farmers' market vendors. Their discussion of how they have approached development of several hive products is a joy to follow. It includes delightful expressions of great respect for the bees and their bounty.

The text is well illustrated with over 100 photos by the authors with help from a couple of photographer friends. The inner cover endorsements include personal and highly complimentary endorsements from the likes of Kim Flottum, Melanie Kirby and Sarah Red Laird (Bee Girl). Steve Sheppard provides an enduring foreword to the book. He equates *Raising Resilient Bees* to the publication of *Scientific Queen Rearing* by G. Doolittle. High praise from a professed fan and frequent visitor to the McEwens' farm. There is both a glossary and workable index. They supply two pages of resources and for various chapters, there are end notes referencing relevant literature for the chapter topic.

Raising Resilient Bees is not solely about keeping bees, although that is the major focus. It is also how we can compatibly work with and benefit both our bees and their environment. A useful addition to your bee bookshelf. BC

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Minding Your Bees And Cues

Paper Wasp Insights

Becky Masterman & Bridget Mendel

In Common

What do *Polistes* wasps and honey bees have in common besides being called each other's names by a sometimes fearful public? The genus *Polistes*, found in the wasp or Vespidae family, are actually closely related to the Apidae family, where bees, including the European honey bee, *Apis mellifera*, are classified. They go by the street name of paper wasp or umbrella wasp and there are over 20 different species found in North America (**https://hdl.handle.net/1813/43829**).

And while their social organization is quite different than that of honey bees, their sociality puts them in a rare category that researchers are keen to study. Researchers are interested in how these wasps initiate nests, interact with and recognize each other and compete with each other.

And finally, the European paper wasp and honey bees share the contentious status of "non-native." We've noticed the conversation around native and non-native species can get simplified to a simple black and white. Perhaps learning about the behavior of these wasps can help U.S. beekeepers gain insight into management of their non-native bees. We're arguing for nuance: how animals migrate, move, get moved, survive, thrive or decline isn't black and white at all: it's black and white and brown and yellow and gray and gold.

Welcome to North America?

While members of the genus *Polistes* are cosmopolitan with some species native to the U.S., *Polistes dominula* originates from Europe and (like honey bees) is non-native in the U.S. While the timing and intent of the U.S. arrival of each species are vastly different, both *P. dominula* and *A. mellifera* are environmentally concerning to conservationists.

While honey bees were introduced on purpose to North America in the 1600's, the arrival of *P. dominula* falls into the invasion biology research realm. First noticed in the U.S. in 1978, they were established both in the midwest and on the west coast by 1998 (Manfredini, et al. 2018). One study showed that the reproductive success of a native *Polistes* wasp decreased when the introduced *P. dominula* nested in the same geographic location. Beekeepers understand the threat that introduced species (*V. destructor* mites) poses to the health of their colonies. Conservation biologists are similarly concerned that non-native species, including honey bees, can lead to the decline or extinction of native species through resource and habitat competition and through the introduction of novel pests and pathogens.

Figure 1. Fall removal of the honey bee colony telescoping covers might just reveal some* Polistes *wasps looking for an overwintering location.

Colony Control

Honey bees are the highly eusocial rockstars of the insect world, as honey production and pollination services increase their popularity with humans compared to the highly eusocial ants and termites. With cooperative brood care, overlapping generations and a complex division of labor that includes reproductive castes, scientists have been asking the question of why honey bee workers evolved to give up their reproductive capabilities and instead work to support colony fitness (hint: contributing to a honey bee colony and raising your full and half sisters is an effective strategy to get your genes into the next generation). *Polistes* wasp societies are considered primitively eusocial and their organization is of great interest to researchers who want to understand the evolution of social behavior. *Polistes* queens and workers are not separate castes (like in honey bees) and their reproductive contributions depend on a number of factors, including physical aggression to suppress reproduction within the nest (**https://www.nature.com/scitable/knowledge/library/an-introduction-to-eusociality-15788128/**).

Beekeepers understand that queen pheromones maintain colony function by suppressing development of worker ovarioles. Thus, there are two controls to worker reproduction, their physical inability to mate and store sperm and the chemical suppression of ovariole development by

the queen. Unlike honey bee queen control over workers, paper wasp nest organization and reproduction is a roller coaster of conflict and cooperation, with a bit of controlled chaos. Spring nests of *P. dominula* are founded by one or more overwintered females, called foundresses. The nest has a higher probability of success when more than one foundress is responsible for reproduction and often there are multiple reproductive females in the nest. Nest aggression is high during the founding stage and becomes more ritualized (and less injurious) once the reproductive hierarchy is established. There is no physiological caste differentiation in *Polistes* females, but the effect of nest dominance battles can change the hormone levels, neuroanatomy and gene expression of the females in the nest.

You Look Familiar

Polistes nests are tiny compared to honey bees and only grow to about 100 members (Tibbetts and Sheehan, 2013). This small colony size makes the next information a bit easier to believe: *Polistes* wasps can recognize each other's faces. While there is also evidence that they use olfactory cues to recognize nestmates once a nest is established, facial recognition is an important cue in their nest organization (Simons and Tibbetts, 2021). Nestmate recognition is a bit different in a honey bee colony; facial recognition is more difficult if your nest includes 60,000 individuals. Honey bees are finely tuned into the olfactory cues and know what their nestmates smell like. Imagine the olfactory cue chaos that can ensue if a beekeeper moves a frame of adult bees from one colony to another!

Bye Bye Boys

Honey bees and paper wasps have very different ways to say goodbye to drones, but neither strategy is a happy ending for the male members of the colony. Because the honey bee nest is perennial, when floral resources are limited in late Summer and Fall, the workers forcibly evict the drones. *Polistes* queens leave the nest to overwinter; you might see them finding shelter under your telescoping covers when the flowers become scarce and the weather cools. The males, left in the nest and with no thermal regulation and food stores, await their chilly end.

In the End

Keeping honey bees means navigating the threats along with experiencing the rewards of your management skills and a healthy environment for your colonies. Understanding the biology of the honey bee and the complexities of social behavior makes you a better beekeeper. That honey bees, despite over 400 years of supporting U.S. agriculture, are viewed by some as a threat to native bees and plants, is a concern that the beekeeping industry needs to address. We think that beekeepers need to be leading a more nuanced conversation about native, introduced and naturalized species. It's not just about where a species originates. It's about a species' unique biology and how they fit into the ever-changing definition of home. BC

Figure 2. Unlike in a honey bee colony where drones are forcibly removed late in the season,* Polistes *males (characterized by yellow faces and curly antennae) are left with a nest without food stores and late in the season, no brood.* Polistes dominula *males are left on this empty nest.

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For more information about Paper Wasps: **https://bugguide.net/node/view/572**

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 paper wasp stories or other thoughts, please send an email to mindingyourbeesandcues@gmail.com

From the University of Florida Honey

January: Overview of the HBREL at UF
February: Honey Bee/Beekeeping Teaching Programs
March: Research on Honey Bees
April: Apiculture Extension (Part 1)
May: Apiculture Extension (Part 2)
June: Roles in a Typical Honey Bee Lab
July: How Labs are Funded
August: The Lab's Physical Infrastructure
September: What it Takes to Run a Laboratory Effectively
October: Professional Development in the Lab
November: Members of the HBREL Team and What They Do
December: The HBREL's Most Notable Successes/Contributions to the Beekeeping Industry

Since January of this year, the readership of *Bee Culture Magazine* has been treated to a "bee's eye view" into the superorganism that is the UF/IFAS Honey Bee Research and Extension Laboratory (HBREL). On any given day in Gainesville, Florida, our lab has the appearance of a highly active colony of honey bees. All of us workers are busy at various tasks that add measurably to the productivity of our entire laboratory. Dr. Jamie Ellis introduced our contributions to articles this year, and for this month, we have the honor of providing a one-by-one introduction to our amazing faculty and staff. Providing a profile of each of us will give you, the readers, a snapshot in time – but make no mistake, we are an ever-evolving group! Just as in your favorite colony insects, there are always a lot of us coming and going. Our goal this month is to provide you with an overview of the kaleidoscope of skills, passions and interests which, when seen all together, make up a world-class research and education facility.

Without further ado, please begin your journey through our team with an introduction to **Amy Vu** (*Figure 1*). Most of you who have followed the other articles will remember Amy wrote extensively in the April and May 2023 issues about "*Apiculture Extension*" at our laboratory. Her fascinating story to the world of bees has brought her to a preeminent position in the UF/IFAS organization. She is literally one-of-a-kind in her role as State Specialized Program Extension Agent, Apiculture for the University of Florida. There is no one else who shares that title! So, while you may refer to a previous article for in-depth discussion about Amy's programming that she provides for the HBREL, it may interest you to know exactly how she came to find herself aligning her life's path with *Apis mellifera*. (Indeed, you will notice that as many folks have found their way to the lab in Florida, there are divergent stories of how they got there.)

Amy's interest in honey bees actually started as a social activity. She and some close friends wanted to explore the world of beekeeping together, so everyone pitched in to purchase one package and one nuc. From the moment Amy installed that first package, she knew she was utterly hooked. She recalled back to when she shook the bees out of the package (mind you, she was aware these creatures could FLY and could STING), and to calm down the colony, she hurriedly sprayed them with water and chased that with a blanket of powdered sugar. The camaraderie and laughter shared with friends were the encouragements they each needed to keep on keeping bees.

Since that first package, Amy has not truly looked back. In her role at the HBREL, her main tasks originate from one point: what questions are the beekeepers asking? Every program she devises and executes comes from needs of the community she serves. What happens and "hot topics" in the apiculture industry directly inform her communications, her workshops, her in-service trainings and her creativity. So, while many in our lab have a direct connection to the insects we study, Amy's work relates to the humans that keep them.

Figure 1. Amy Vu, Photo Credit: US/IFAS Communications

Bee Research and Extension Laboratory

Members of the HBREL Team and What They Do: An Ethic of Excellence

Natalie B. Parkell

In her dreams for her future of the HBREL, Amy's main goal is providing the resources that solves beekeepers' problems. Her dream would be that no one would ever lose a colony again – the ultimate measure for success would technically put her straight out of a job! But that is what makes this place so special: all our team members want to make the world a better place, even if they find themselves unemployed for doing it.

A relatively new addition to the HBREL is **Breonna Davis** (*Figure 2*) Breonna is a PhD student at the University of Florida who found her way to the lab from a vastly different direction. She graduated from Florida Agricultural & Mechanical University (FAMU) with a Bachelor of Science in Criminal Justice and a minor in Pre-Law. (If you are scratching your heads right now at the transfer from Criminal Justice to Entomology, you would not be alone.) Regardless, her master's degree at FAMU focused on the infamous small hive beetle. She monitored and managed insecticide resistance in her study, working with tactics known collectively as integrated pest management (IPM). She used strategies such as chemical and biological control, looking in the beetle's biology for its resistance level to certain chemical doses. That led her to wonder, "What is causing these beetles to become resistant to the chemicals being used, and how can I reduce their impact?" She studied the mechanism of resistance and how she could manage that resistance to reduce the economic and production loss from small hive beetles.

Upon completion of those projects, Breonna realized she did not agree with, nor particularly like, the concept of using pesticides to solve pest problems. Although the research was toxicology based, she subsequently began an independent research project using biological control to reduce the impact of small hive beetles. The biocontrol agent she used to test efficacy in controlling beetle populations were nematodes. With understanding the benefits of both biological control and chemical control, Breonna realized more than just one control method would be necessary to minimize the damage caused by these beetles. An application and doctoral project later, and she became a member of the HBREL family in 2022.

Figure 2. Breonna Davis, Photo Credit: Ruby Nolan

Breonna's long-term focus is to test the IPM "pyramid" of strategies, applying mechanical, physical, biological, chemical and cultural methods to combat small hive beetles. While she still respects the place chemical intervention has for treating pests, she hopes to steer away from that strategy and encourage beekeeping professionals and others to manage the small hive beetle in other ways. Her research will show people the best way to manage beetles using all tactics of IPM before it gets so severe that someone would have to apply pesticides, recommending that chemical control be the last result. Breonna said, "I desire to solve small hive beetle problems for the beekeeping industry the best way I can. I am excited to be working at the HBREL and can't wait to accomplish more great things in contribution to all the great research done here!"

Readers of this column from the University of Florida may remember **Dr. Cameron Jack's** article in February 2023: *The University of Florida Honey Bee/Beekeeping Teaching Programs*. And while Cameron is currently a powerhouse instructor, teaching literally hundreds of students each semester, he started from more humble beginnings. He mentioned in his article growing up around honey bees and beekeeping, but his real "AHA!" moment with honey bees came much later in his life.

He was pursuing a master's degree at Oregon State University and had originally started his research in the field of bats. (Certainly, there is a joke in here about "the bats and the bees".) Cameron knew he enjoyed re-

search – and he liked bees – so after a short stint into the degree, he realized he could combine the two into a life path. After presenting many workshops and hearing persistent questions about the dreaded *Varroa destructor*, he knew he had to rise to the challenge and go to the hotspot of *Varroa* research. Cameron was Florida-bound.

He described in his previous *Bee Culture* article about his day-to-day responsibilities as teacher and researcher. He diagrammed the UF courses in detail, including the success and popularity of the online course offerings. Cameron works tirelessly in the pursuit of excellence in his field – and his goals for the future of the HBREL are twofold. First, he passionately hopes to develop a full-fledged degree in Beekeeping, with offerings in pests, pathogens, business management, colony management and nuts 'n' bolts beekeeping. He hopes one day to "pump the industry full of educated people" to raise the caliber of professionals entering the profession. Having individuals trained in biology, economics, IPM protocols and more can only fortify the apiculture industry throughout the world.

Additionally, Cameron sees the HBREL as the cutting-edge institution for pest solutions to *Varroa*, small hive beetles and the next wave of honey bee afflictions. He envisions the lab as a leader of change in turning the corner on pest management, stewarding world-class researchers to solving the most pressing problems facing *Apis mellifera*.

Our next featured team member has also graced the pages of this periodical in recent months: **Chris Oster** (*Figure 3*). Many of you will recognize our lab manager and research coordinator from the featured article in August 2023 about the facility at the UF/IFAS Honey Bee Research and Extension Laboratory. While Chris' first exposure to honey bees came in Dr. Cameron Jack's Summer Practical Beekeeping class, he admits he was not immediately sold on "the whole bee thing." Needing to satisfy a credit in physical sciences for his degree, he signed up for the class without much thought. Only afterwards, did Chris appreciate the culture surrounding bees, beekeeping research, history and biology of these insects. (*Tongue in cheek, Chris shared he got a "B" in the class. – Ed)*

Figure 3. Chris Oster, Photo Credit: UF/IFAS Communications

As you readers may have gleaned, Chris wears perhaps more hats than any other single member of the HBREL team, serving equal parts Extension educator, beekeeper and custodian. For many people who visit the HBREL in Gainesville, he is the face of our lab. He provides tours of the facility for nursery-school aged youth up to VIP University deans. He is equally adept at providing classes onsite, both in lecture room and "suited-up" in the teaching apiary. Chris's management of several colonies allows him access to a valuable, hands-on demonstration tool for people who learn best by experiencing directly in context. Most importantly, though, Chris is the "go-to guy" when things come undone. When a freak electrical surge destroyed the panel to an entire building, it fell on Chris's shoulders to arrange for the lengthy and costly repairs. Without that level of dedication and vigilance, the lab's activities would literally be in the dark.

When asked about his dream for the future of the HBREL and his role in it, Chris stated, "I want this lab to be the one people look to for answers, doing the most relevant research on honey bees… If we attract the best, be the best, hire the best, we can accomplish the best." Chris even echoed Amy's sentiments in our role in protecting the health of honey bees everywhere: "In a perfect world, we would not actually have use for this lab. But it's NOT a perfect world." Chris exemplifies the dedication that surely shines through in these snapshots of our team members!

Our next team member's first memory of honey bees harkens back to age six. While scaling the world's largest apple sculpture (known affectionately in Canada as "The Big Apple"), young **Devan Rawn** (*Figure 4*) was mesmerized by the roadside attraction's observation hives: "I was fascinated and just STARED!" The childhood experience never did leave him, and at age 22 while finishing a Bachelor of Science in Marine Biology, Devan came upon a Summer job with the Ontario Beekeepers' Association. In his words, "I remember working long hours, hot days and heavy lifting, but at the end of the Summer, I still wanted to continue working with bees." And so, it began.

After that first Summer, Devan continued years of full-time work at the provincial Tech Transfer Program, conducting teaching and practical research. In addition to working in commercial beekeeping operations in Ontario, he spent a season beekeeping in New Zealand, taught courses in the commercial beekeeping program at Niagara College Canada, and worked as a field technician for other honey bee research projects.

Currently as a field technician at the HBREL, his work involves the practical beekeeping side of research. He works closely as sidekick to beekeeper Steven Keith, actively managing hives for research projects. He makes himself available to assist other members of the lab and students in carrying out their research objectives, focusing on three main areas: nutrition, queen breeding and *Varroa* control.

Devan has found his niche with his skillful queen rearing program, which is vital to standardizing populations across many colonies. His other research support includes monitoring commercially available breeds of honey bees for *Varroa* resistance and other economically important traits. He hopes to inform Florida beekeepers about stocks of honey bees that may be especially healthy and profitable for their production.

While Devan brings a broad skill set to the lab to assure the research runs smoothly, his long-term goal as a field technician is to bridge the gaps that may exist across our laboratory. He hopes to "get his hands dirty and build something new to find the answers to questions posed by research." Ultimately, he hopes to be known as the "MacGyver of the Bee Lab", having the ingenuity to devise the most resourceful solutions to problems related to honey bees.

If Devan could be known for his skills in creative problem solving, **Julia St. Amant** (*Figure 5*) is probably known for her laboratory work and attention to detail. Her vigilance as lead lab technician had her hot on the trail for solutions to *Varroa destructor* and small hive beetles, while performing toxicology research on these persistent pests. Julia found her way to the HBREL in the manner that many do: Dr. Cameron Jack's ever-popular Beekeeping I class. Halfway through her B.S. degree in Biology from UF, Julia stumbled upon the "Wonderful World of Honey Bees" – and devoured every related course that UF had to offer! Adding a minor in Entomology and Nematology, she jumped in with both feet and volunteered at the lab.

Degree in hand, Julia was hired in May 2022 and that is when the hunt for solutions really began. Her first project as a technician was to test chemicals to see if they could be used as possible treatments for mites. Testing a specific chemical class used in veterinary medicine for treating fleas and ticks, Julia found she needed a lot of mites. She kept honey bee colonies using a technique called "backwards beekeeping," where she rotated frames from untreated colonies into colonies called "mite factories." These mite factories could produce 100 mites per 300 bees during peak season. Once collected, she used a machine with a syringe to drop a mite-size dose onto the backs of each mite individually. (Talk about detailed work!) The results of these bioassays were analyzed and toxicity of the chemicals on mites was compared to their toxicity on honey bees.

Figure 5. Julia St. Amant, Photo Credit: UF/IFAS Communications

Julia's second project compelled her to find chemicals that were toxic to small hive beetles. After hand-rearing small hive beetles in the lab, the pests were exposed to different chemical classes, including active ingredients from roach baits that are often used off-label in honey bee hives. The doses were applied directly, by individually adding the chemicals to their back, or by feeding them treated pollen. She also tested these chemicals directly on honey bees to understand how the toxins would affect them when introduced into a hive.

Figure 4. Devan Rawn, Photo Credit: UF/IFAS Communications

More recently, as the weather got colder, Julia trekked another research trail that compared Summer and Winter honey bees and their susceptibility to different chemical classes. After completing toxicology screenings on honey bees from certain colonies in the Winter, she repeated the treatment on the same colonies in the Spring. The purpose of this study was to see if chemicals would impact honey bees differently based on the time of year. Julia has since moved on from her laboratory technician position to become a graduate student at the HBREL studying the effects and distribution of *Malpighamoeba mellificae*, an amoeba found in honey bees. The lab is fortunate to be able to still rely on Julia for her diligence and passion in research, her willingness to contribute to the education of others and her skillful beekeeping.

Readers, you may remember your introduction to our next lab

team member**, Kaylin Kleckner** (*Figure 6*), in the June 2023 article about roles within a honey bee lab. Along with being a talented writer, Kaylin is driven by her passion for entomology. As she puts it, she "grew up with an intense fascination for the natural world and *all* the creatures in it. As a child, I created an alphabetized collection for my butterfly specimens and begged for a microscope for Christmas. Looking back, it is not surprising I became an entomologist… I consider myself an admirer of all insects – not just honey bees. I spent time working with a variety of insects before I meandered my way into beekeeping." Before arriving at the lab, Kaylin helped turn stink bugs different colors with molecular tools, identify over fifteen new species of South American butterflies, and describe patterns of feeding ecology in leaf-footed cactus bugs. Her foundation of inquiry, good science and passion for insect behavior led her initially to sign up as a volunteer at the HBREL.

Her very first role was washing dishes and performing mite washes. Perhaps not glamorous, but this started her long, meandering trail to honey bee specialization. Kaylin worked as assistant to Dr. Cameron Jack, researching *Varroa destructor* that culminated in his PhD. Before she knew it, she had taken every honey bee course the University of Florida offered, conducted independent research projects and accepted a part-time position as a laboratory technician. After graduating with her B.S. in Entomology, a pandemic canceled all her adventuring plans, and Kaylin moved into a full-time field technician position. With that job came the opportunities to gain experience with beekeeping and assist with a wide variety of field studies.

One of the major research goals of our laboratory is the identification of new control methods for honey bee pests and diseases. One of these target pests is the small hive beetle, whose larvae destroy frames as they tunnel through the wax and consume resources and brood. To make matters worse, there are only two chemical controls registered for use for SHBs in the United States. Ideally, beekeepers would have access to a variety of effective chemical control options to rotate in an integrated pest management system to knock down

Figure 6. Kaylin Kleckner, Photo Credit: Chris Oster

pest populations when needed. Kaylin collaborated with a visiting scholar from Italy and researchers at the USDA laboratory in Gainesville to develop an effective new methodology that can be used by researchers globally to screen new chemicals for SHB control. This research is published in the journal of Applied Sciences (**https://doi.org/10.3390/app12199905**) with free access for everyone – so be sure to check out the article: *A Novel Acute Toxicity Bioassay and Field Trial to Evaluate Compounds for Small Hive Beetle Control.*

In another project that Kaylin found challenging and rewarding, a colleague conducted a series of projects examining the effectiveness of pollen patties. During her time as a field technician, she helped the teammate conduct a research project to answer the question, "At what age are workers interacting with pollen patties?" The first step was to paint thousands of newly emerged workers. This created an identifiable cohort of bees which the researchers knew the exact age. Next, they released these painted workers into five-frame nucs with dyed pollen patties. For the next month, Kaylin collected twenty marked workers from each colony and looked for the presence of dye in their guts. This process generated over 7,000 samples that had to be individually labeled, processed and visually inspected. With the help of some statistical modeling, they found that worker pollen patty consumption gradually increased until peaking at day 19 of the worker's life. (*Important Note: The full findings of this study are still in the process of publication but should have public release soon.*)

Kaylin's current status within the laboratory has evolved to her pursuing a PhD at UF. She is studying wild *Apis mellifera* nesting ecology, behavior and population genetics on location in South Africa. She is scheduled to leave the U.S. for six months of field work locating and sampling colonies. She will make at least one more journey to Africa as she has three more years before completing her degree.

While Kaylin enthusiastically strives every day to advance the body of knowledge surrounding her favorite six-legged, social insects, her main goal is to help beekeepers become better stewards of honey bee health. In her summation of the contribution to this article, Kaylin wanted everyone to know, "I dream of a future where wild and unmanaged honey bees receive the attention and admiration I believe they deserve… Through my research and sharing my experiences abroad, I hope to shed light on wild honey bee ecology, behavior and biology to inform conservation initiatives and habitat restoration projects. Plus, we as beekeepers can learn a lot from wild colonies thriving in diverse,

harsh environments!" From a young woman who got her start washing dishes to an international traveler and researcher, Kaylin is blazing a trail with her lifetime of excellence and inquiry.

Now, the next member of our team comes with serious credentials. While several of the HBREL members hold the title of Doctor of Philosophy (PhD) or are actively working toward that degree, **Dr. Marley Iredale** (*Figure 7*) is actually a Doctor of Veterinary Medicine (DVM). As a child, Marley always loved animals, especially those things that were not easy to love. She recalls, growing up she owned pet tarantulas, geckos, rats, walking sticks – and eventually a dog. Her passion for the environment and wild, living things earned her a degree in Wildlife Ecology from Washington State University. Studying endangered western pond turtles and bighorn sheep, she finally earned her veterinary degree. While pursuing her specialty of anatomic pathology at the University of Florida, Marley studied horseshoe crabs, Komodo dragons, giraffes and bonnethead sharks. Even then she was working to diagnose illnesses and infectious diseases in diverse and interesting creatures!

Figure 7. Marley Iredale, Photo Credit: Dr. Marley Iredale

So how did she make the leap to honey bees? While studying for her certification exam, Marley recalls that:

> *My resident-mate turned to me and said, "Marley, you're going to love this!" She then showed us a journal article about Deformed wing virus. I thought it was amazing! I fell in love with honey bees on the spot, and that's when I decided I wanted to study them for my PhD dissertation. The universe agreed because, luckily for me, we have a world-class honey bee research facility here at the University of Florida.*

It was after that epiphany that Marley was able to connect with Dr. Jamie Ellis and Dr. Bryony Bonning. Her dissertation investigated how Israeli acute paralysis virus causes disease in honey bees and possibly how to provide novel avenues of treatment.

Marley's goal for her studies and research is to make connections between veterinarians, beekeepers and bee researchers to provide a foundation for the improvement of pollinator health. Developing resources for veterinarians to learn about honey bees will aid in bringing more options to honey bee medicine. So, while passionately dedicated to her research, Marley can also be found teaching at Bee College or providing interactive bee encounters to pre-school "Baby Gators." She speaks at beekeeping clubs, student organizations, veterinary groups and almost anyone else with a similar passion for honey bees. In Marley's words, she "loves teaching and is thankful to have so many opportunities to connect with beekeepers." (*Note: Dr. Marley Iredale successfully defended her dissertation of* Honey Bee Disease Diagnostics and the Role of Veterinarians *in July 2023.*)

Figure 8. Samir Kadri, Photo Credit: Amanda Haisi

The magic of the UF/IFAS Honey Bee Research and Extension Laboratory does not seem to stop at our geographic border. Scholars as far away as Brazil are lending their talents to the lab, and that is where research intern, **Samir Kadri** (*Figure 8*), calls home. From Botucatu City in Sao Paulo, Brazil to Gainesville, Florida seems like an unlikely path, but Samir first encountered *Apis mellifera* in a cow pasture at his parents' small farm. Swarms took up residence inside old termite tunnels, and this invincible teenager decided he could transfer the swarm to a beehive. (You can guess how that ended.) However, a couple of months later, Samir was able to capture two swarms in traps, but he noticed something odd: one colony produced an abundance of honey and the other produced none. He became transfixed with understanding these insects.

Samir studied animal sciences as an undergraduate, received a master's degree, and eventually earned his PhD (in Animal Production) in beekeeping linked to molecular genetic techniques. His postdoctoral work looked at genome-wide association studies for honey production, defense and hygienic behavior phenotypes. It was after reading scientific manuscripts published by the HBREL research group that Samir reached out to Dr. Ellis to submit for a visiting research scholar position.

Samir's few months in the United States are focused on testing DNA and RNA from African derived honey bees, learning to screen for up to ten diseases (from virus, bacterial and fungal vectors), and trying to correlate between disease pressure in *Apis mellifera* and their honey production. Samir's lofty goals are all the more impressive given his window of opportunity is about four months! As if his impressive resume was not enough, Samir also keeps bees part-time in his hometown. His dream for the future and what drives him to traverse the thousands of miles to Florida is "living in a world [where] everyone cares about honey bees, knows the importance of bees for humans and ecosystems, and where no one ever reads news about honey bee mortalities caused by human acts." How is that for a vision to "Save The Bees"!

Frequent readers of this series may remember their introduction to **Steven Keith** (*Figure 9*, next page) in the June 2023 article. If Steven was a cattleman on a ranch overseeing a large-scale population of cows, he would be "cow boss" or "ranch foreman." He would be dedicated to the movement of his herds, the upkeep of their health and well-being, the maintenance of their shelters, and the logistics of managing the operation. Indeed, "lead beekeeper" does not quite capture the romance that cowboys enjoy, but keeping bees is considered keeping livestock, at least in Florida. And wrangling bees is a full-time venture!

Steven came to the HBREL, as so many members have, from a completely different compass heading. Steven had been working full time in South Florida, valet parking cars and delivering pizza, while simultaneously pursuing his degree to become a trauma or emergency room registered nurse. He knew exactly nothing about bees, but a fellow student in his program asked him one day if he wanted to join him at his beeyard. It was the middle of June (translation: blazing hot already for the Summer), but Steven donned three

Figure 9. Steven Keith, Photo Credit: Devan Rawn

Figure 10. Vernaeyah Lane, Photo Credit: Devan Rawn

pairs of socks and a full bee suit. Completely detached from agriculture his whole life, he pulled out his first heavy frame of honey – and got "bit by the bee bug."

Steven did what most people do when they first encounter bees these days: watch a lot of YouTube videos. He researched in his spare time and went back to the 80-colony beeyard frequently. He spoke with the president of the Palm Beach County Beekeepers Association who agreed to mentor him and began a few hours of part-time work there. Shortly thereafter, he assisted a bee removal specialist for about six months, and then with one semester away from graduation for his RN degree, Steven left school to begin his full-time beekeeping business. He never looked back.

Did we mention that managing bees at a research facility is demanding work? Steven's dream for his program at the lab is to develop a small herd of bee ranchers, maybe up to five, who can facilitate research on bees year-round. He hopes to one day have the capacity of field technicians to maintain 300-500 colonies, with all the funding and infrastructure to meet the demands for solving the problems that beekeepers consistently face. So, while not every member of our lab team comes from such a divergent direction, Steven's life was abruptly changed on the very first day he experienced the fascination of *Apis mellifera*.

In the case of new team member, **Vernaeyah Lane,** (*Figure 10*), the seed of love for entomology was planted by her mother at age six. She and her mom spent many weekends with jar in hand, tiny holes punched in the lid, and a mission of catching caterpillars and watching them transform into beautiful butterflies. This connection with her beloved mom and nature instilled in Vernaeyah a passion for scientific discovery.

Establishing a firm foundation at Tuskegee University and receiving a B.S. in Animal, Poultry and Veterinary Science, Vernaeyah joined the Tuskegee Bee Club which gave her the first field work experience in bee biology and behavior, hive management, queen rearing, swarming, and pest and disease management. She went on to Auburn University for a Master of Science in Agricultural Science Education where she sharpened her skill set with outreach and educational programs to raise awareness about honey bees, their importance in pollination and the threats that they face.

Fast forward to the UF/IFAS Honey Bee Research and Extension Lab, Vernaeyah is eager to grow in the field of entomology, research and laboratory science. She considers herself a "blossoming young scientist" and is thrilled with the mentorship of Dr. Cameron Jack and her first project of the *in vitro*

rearing of worker bees, *Apis mellifera*. She serves as lead lab technician studying the effects of toxic substances on honey bees; specifically, how pesticides, pollutants and other chemicals can impact the bees' physiology, behavior and reproduction. Her goal is to identify specific mechanisms of toxicity and determine how chemicals applied in the environment will impact honey bee colonies. In her words, Vernaeyah said, "I am excited about the limitless possibilities the future holds and look forward to my exploration of the unknown, pushing boundaries and making meaningful contributions to the advancement of honey bee science." She believes one of her primary missions in this field is to learn how best to teach others who do not readily have access to the types of opportunities she was given – a blend of the research with the extension (as in the lab's title). And just like that, a vibrant six-year-old grows up to figure out her path to help save the world, one bee at a time.

Figure 11. Jamie Ellis, Photo Credit: Jessica Wells

Next comes **Dr. Jamie Ellis** (*Figure 11*). Jamie was hired by the University of Florida in August 2006. Since that time, he has partnered with beekeepers to address extension, teaching and research needs of the industry. Jamie started keeping bees when he was 12. Beekeeping was not in his family. He became interested around age eight, but it took him four years of reading/studying before he was able to get his first colony. He managed a small hobby operation through middle and high school. During that time, he conducted 4-H and science fair projects on honey bees.

In 1996, Jamie moved to the University of Georgia where he pursued his bachelor's degree in biology. While there, Jamie worked in the laboratory of Dr. Keith Delaplane, a well-known member of the honey bee research/extension community. Jamie's interest in honey bee research ballooned during the time he worked with Dr. Delaplane. Dr. Delaplane mentored Jamie and encouraged him to consider pursuing a PhD in entomology at an overseas institution, which Jamie ultimately did. Jamie's graduate plans landed him at Rhodes University in South Africa. There, Jamie studied small hive beetles under the supervisory guidance of Dr. Randall Hepburn. Jamie's international perspective grew significantly during that time. Jamie returned to the University of Georgia in 2004. As a post doc in the laboratory of Dr. Delaplane, Jamie continued his investigations into small hive beetle biology and control until he was hired by the University of Florida.

Jamie has a three-way academic appointment at the University of Florida. This means he has responsibilities in honey bee research, teaching and extension. From a research perspective, Jamie's interests include projects related to honey bee husbandry (honey bee disease/pest control, nutrition, toxicology, etc.) and ecology/conservation. Through his teaching appointment, Jamie trains masters and PhD students, in addition to mentoring undergraduate students. Jamie's largest appointment is in extension. Through that, he partners with beekeepers globally to improve the health of managed honey bee populations and ensure the sustainability of beekeeping for years to come.

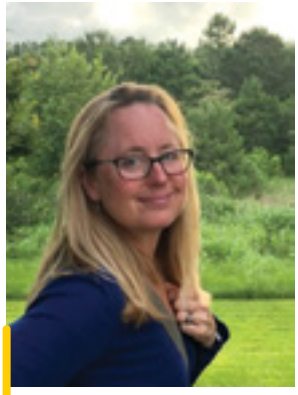


Figure 12. Natalie Parkell, Photo Credit: Kevin Osburn

Finally coming to the caboose of this train, I am happy to introduce myself. I am **Natalie Parkell** (*Figure 12*), and I come to the world of bees from the horticultural side of things. As a former commercial vegetable producer and farm owner, I have relied on the work of the over 300 bee species in the state of Florida for my livelihood. Every good farmer knows that without our friends the honey bees, watermelon and other cucurbits (think cucumbers, cantaloupes, pumpkins, zucchini, etc.) would be impossible. Life without pumpkin pie would just not be worth living. My appreciation for honey bees as part of a larger ecology is deep and wide – as well as my sweet tooth for honey as I consume it every single day in my coffee.

My interest in joining the HBREL is another chapter in a series of University of Florida Extension positions after leaving the farming profession. Beginning as a research and extension assistant in a hydroponic greenhouse facility in northern Florida, I then worked in south Florida as a food system specialist, providing programming support for community centers, schools and other non-profit organizations in gardening for youth. I became a 4-H Youth Development Agent bringing my passion for science, agriculture and the environment to thousands of kids. My background in youth education continues here at the bee lab – I find every excuse I can to inspire children with a love of learning. A hands-on, experiential teaching style and a healthy dose of humor are ways I seek to engage the multitudes that find their way to our programs. Whether I am organizing the resources to put on our annual Bee Colleges or answering swarm-related questions or authoring articles for beekeeping trade publications, I work to improve the lives of Floridians and others. If I had one wish that my Fairy Bee Mother could grant, it would be that people become more aware of the interconnectedness of all things, the importance of the natural world and the role humans have in conservation of habitat for the myriad of other species with whom we share this planet. Ultimately, my goal is to inspire and educate, bees and beyond.

As an institution, the University of Florida's Honey Bee Research and Extension Laboratory exists because we are entrusted with helping to manage the needs of our apiculture community. When beekeepers and others who ask questions finally find the solutions they need, we will have collectively put ourselves out of our jobs. But the problems facing honey bees will surely evolve, as will our solutions to those problems. We are proud to be a resource to whom beekeepers can turn, and we hope with this brief window into our team members' lives, you feel confident in placing your trust in us. Call or write any time. BC

Resources on all aspects of beekeeping can be found on our website: ***www.ufhoneybee.com*** *or you may email us at* ***honeybee@ifas.ufl.edu****. Additionally, you may find frequent updates on our social media channels @UFHoneyBeeLab. The University of Florida is an Equal Opportunity Institution.*

BEE VET

Time for Some Muscle

Dr. Tracy Farone

As I am writing this, it's Labor Day (but it may be time to be thinking about turkey dinners by the time you read it). It's a time of transition in many things, back to school, bee-

All the tasks of the hive require healthy locomotion, even flying with a tongue sticking out! Credit: GCC bee project

keeping chores, Summer to Fall. One of the jobs I have been privileged to do for the past 20 years or so, is to teach Anatomy to students who will most likely pursue a career in a health field. It is and has been a great privilege to lead these students through the foundational language and the creative form of their new calling. While human anatomy is largely our focus, I also offer students a taste of comparative anatomy between mammalian species to illustrate the similarities in anatomical design. Anatomy is also paramount in understanding normalcy and pathology in honey bees.

Volumes have been written (and drawn) on the subject of honey bee anatomy, and I will not even try to tread upon the greatness of Snodgrass. Yet, anatomy remains the foundational science to medicine, including honey bee medicine. So, I've decided to write a series of mini lessons about these foundational basics for you from a clinical, system by system, in-the-field perspective.

A good beekeeper must know what normal is before one can identify abnormalities in your hives. How do you get good at identifying abnormal? Answer: Look at a whole lot of normal. You will receive a free ride to go along with my class. I will break down important anatomical things to look for as well and their medical significance. We will start with the musculo-skeletal system, dive into the control systems of the body, the nervous system and endocrine system, take a peek at the reproductive systems of the bee, move through the gut and excretory systems, and finish with the open vascular and respiratory systems of the honey bee. By next Spring, you'll be ready to apply what you learn over the Winter as inspection season ramps up. In a comparative sense, it is the same syllabus for my pre-med students. Let's go!

Honey bee infected with deformed wing virus (DWV). DWV may be transferred to bees by Varroa mites, resulting in deformity of the wings. Credit: GCC bee project

Skeletal System of the Honey Bee

What it is/What it does: In honey bees, their outer covering is

a combination like that of skin and bone in mammals and humans. This exoskeleton provides an armor-like barrier between the environment and the rest of the body. The exoskeleton provides physical protection, much like skin and bone, but all from the position most exterior to the rest of the body. Protection from dehydration and the entry of pathogens into the body, as well as plentiful hair are more skin-like in nature. A waxy coating covers the exoskeleton. These protections play a large role in innate immunity, the first line of defense for any organism against disease agents.

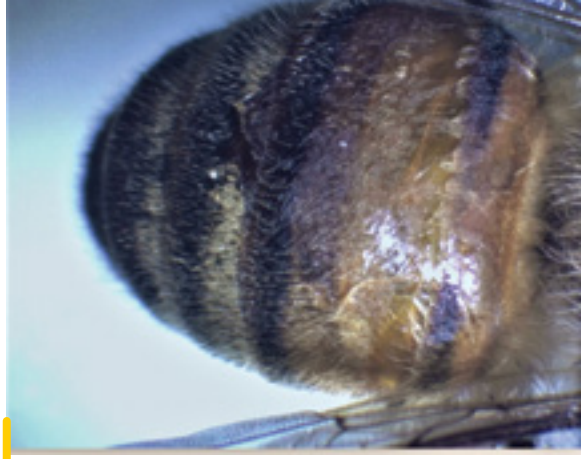
Much like bone, the exoskeleton provides attachment points and support to the skeletal muscles of the thorax. Color of the exoskeleton can vary in pigment and pattern with yellow, orange, black and grey hues commonly found in a variety of *A. mellifera* sub-species. Various glands' ducts exit and release their product through or around the exoskeleton, ex. wax glands.

How it should look: The cuticle surface of the exoskeleton should appear smooth and shiny when seen in between and under hair covered areas. Hair should be prominent over the head, thorax, and even portions of the abdomen, eyes and legs. No breaks or caved-in appearance to the exoskeleton should be seen. Multiple colorations are likely in honey bees. *Make a note to pay attention to the look of the exoskeleton next time you inspect your hive(s).*

Related Pathology: If the exoskeleton is compromised, the following diseases may be involved in either a primary or secondary manner. Brood may be more susceptible to certain diseases because their exoskeleton is not fully developed yet.

Varroa destructor gain entry into the body by piercing the exoskeleton in the ventral abdomen and essentially sucking out the fat body of the bee. Additionally, these piercings leave gaping wounds in the exoskeleton, that then allow for the entry of infectious agents, like the dozens of honey bee viruses. These gaps also subject the bee to increased dehydration.

Nutritional deficiencies could prevent the proper carbohydrate and protein balance needed to create the chitin components of a healthy exoskeleton.



Dorsal abdomen exoskeleton – is that a defect? Credit: GCC bee project

Muscle System of the Honey Bee

What it is/What it does: The bulk of the skeletal muscles in the honey bee are found in the mid-body section, the thorax. These muscles are used to move the six legs and the four wings attached to the thorax region. These muscles also help to pump air through the honey bee's respiratory system when extra air is needed. They can also aid in vascular circulation of the hemolymph, a bee body fluid like blood. Interestingly,

Get a handle on the normal look of your bees. Credit: GCC bee project

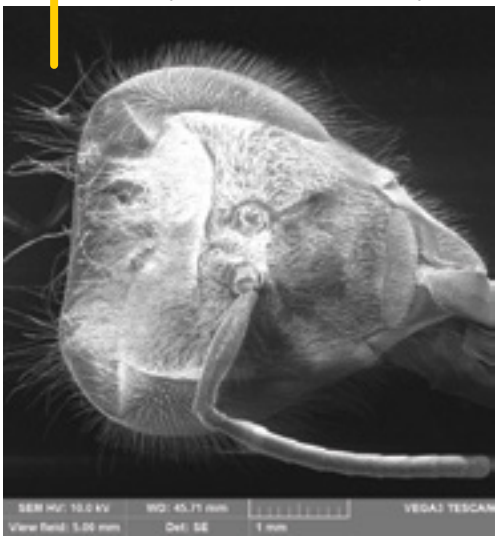
Note the plump thorax on this forager. Credit: GCC bee project

thoracic muscle contraction is required for mammals and humans to breathe every few seconds and aids in cardiovascular circulation.

Honey bee muscles are large and strong, relative to a small individual. These muscles are arranged in two muscle layers longitudinally and vertically. The muscles, anchored to the exoskeleton, work inversely to raise and lower the wings in flight.

How it should look: Normally (and obviously), you should not be able to directly see honey bee skeletal muscle on a living bee. However, the thorax should have a round, plump appearance with all wings and legs attached to the thorax. Wings and legs should move freely and functionally. *Follow a few bees in your hive during your next inspection and take a few seconds to determine if all the legs and wings are moving properly.* Dissection of dead (but otherwise healthy) honey bees will reveal that the internal thorax will be dominated by its muscle layers. Loss of thoracic muscle tone or wasting is indicative of chronic disease. Injured, deformed or missing limbs on individual bees could be a typical aging change, but if prevalent throughout the hive, consider chronic parasitic and infectious diseases.

Hairs are normally all over the external surface of the honey bee. Credit: GCC bee project



Related Pathology: One downside of having nice, big muscles is that everyone wants some. The meatball-like thorax of the honey bee makes them attractive to predators, like birds and Asian giant hornets.

Muscle wasting could be related to: *Varroa*, honey bee viruses, Parasitic mite syndrome (PMS), and/or nutritional deficiency. Remember, it takes protein to build strong muscles for everybody. Loss of locomotion, flight, and/or the ability to use their highly specialized legs is devastating to the individual honey bee and any contribution they make to the colony.

Tune in next month for our next lesson on the nervous and endocrine systems of the honey bee! BC

References and for further study:

Anything written by Snodgrass.

Anything written by Samuel Ramsey on the topic. Here's a primary article:

Ramsey SD, Ochoa R, Bauchan G, Gulbronson C, Mowery JD, Cohen A, Lim D, Joklik J, Cicero JM, Ellis JD, Hawthorne D, vanEngelsdorp D. Varroa destructor *feeds primarily on honey bee fat body tissue and not hemolymph.* Proc Natl Acad Sci U S A. 2019 Jan 29;116(5):1792-1801. **doi: 10.1073/pnas.1818371116**. Epub 2019 Jan 15. PMID: 30647116; PMCID: PMC6358713.

Great anatomy pictures and muscle views. **https://bee-health.extension.org/anatomy-of-the-honey-bee/** Vidal-Naquet, Nicolas. *Honeybee Veterinary Medicine:* Apis mellifera *L.*, 5m Publishing, 2015.

Off the Wahl Beekeeping

WINTER IS ALMOST UPON US

Richard Wahl

Consolidation of Hives

If the bee population in a hive is not as strong as it should be or a queen seems to have a spotty brood pattern, it is time to think about marrying any weaker hive to another. This assumes the weak colony is not due to disease or a mite overload. Dispense the weaker queen and place a sheet of newspaper above the gaining hive super with the donor super placed above the newspaper. If both hives have capped brood, try to orient the capped brood of one super over the brood of the other. This provides one larger brood nest between the two hive supers rather than having smaller brood areas in two separate locations. It is more likely that the Winter cluster will form over this combined brood cluster, making it easier to care for new emerging bees and they will have a better chance of Winter survival. In the time it takes bees to chew through the paper, the donor bees will be accepted by the gaining hive.

Newspaper between a queenless hive above and queenright hive below. Eventually they will be condensed to two deeps.

You will need to clean the newspaper refuse off the bottom board several days later so as to not have all that chewed newspaper absorb moisture at the bottom of the hive throughout the Winter. This can be done with a curved metal bar, the same as used to pull out dead bees from the bottom entrance to avoid another opening of the hive. As Fall changes to Winter, when temperatures start to routinely dip below 45°F (7°C) at night, it is time to force any bees out of any partially filled honey supers and into the one or two deeps. This can be done by shaking and sweeping remaining bees off honey frames and storing those honey frames for the next season.

The same is true of a less populous ten frame double deep hive. Move any brood and honey filled frames to the accepting deep and be sure the queen is in the accepting deep. Shake/brush any bees off the donating partially filled or empty frames into the accepting deep to consolidate your hive. It is more likely that what looks like a crowded hive will get through Winter rather than a more sparsely populated hive, provided the Winter honey and feeding requirements are met. Many of the crowded bees have worked hard the last part of Summer/Fall and will soon die off and make space for newly emerged brood. Many of the brood that emerged in August, and surely those emerged in September and October will be your bees that live through the Winter. If you are maintaining eight frame deeps you will need to decide whether to move bees into two deeps or if you seem to have a very generous population of bees, leave them in three deeps. This assumes adequate honey stores are available to carry them through the Winter, which brings us to Fall feeding.

Fall Feeding

If you have hives on the light side, but plenty of bees, feed liquid sugar syrup in a two parts sugar dissolved in one part water as late into the Fall or early Winter as possible. Here, the exact ratio is not critical and can normally be measured by volume. Syrup feeders can be left on until the temperatures at night routinely fall below freezing. Any of the variety of feeding methods may

A gallon bucket feeder over the inner cover opening. When surrounded by another empty super it will be covered with an outer telescoping cover.

be used. A good rule of thumb is to start late Fall/early Winter feeding about six weeks before continuous cold weather will arrive. A feeder that sits over an inner cover hole that is surrounded by another empty super with the outer cover over it may be left on a bit longer as the bees keep the hive temperature above freezing, even if outside temperatures fall below freezing on occasion.

If there has been a Fall dearth, the feeder will need more frequent refills. This assumes any honey supers have previously been removed. I like to leave any Fall nectar flow to the bees as they will gather flower nectar before using the sugar syrup if nectar is available. As a general rule of thumb, a single ten frame deep hive should weigh nearly 60 to 70 pounds (27 to 32 kilograms) while a double ten frame deep should be closer to 100 pounds (45.5 kilograms) in our SE Michigan area. The weight can be estimated by lifting one side of the hive followed by lifting the other side to get a "feel" for the weight. Lifting some other heavy object that has a known weight can be used to give an idea and serve as a muscle memory of the desired weight. Another method is to purchase an inexpensive suit case scale, lift each side of the hive and add those weights to get a rough estimate. After several years of beekeeping the simple physical lift will give a good idea of the hive weight. However, the weight is not as important as getting a feel for the needs of the bee population in the hive to get through the Winter. As with all things in beekeeping, there is no one direct answer and the prior numbers are suggested for a relatively strong hive going into Winter.

Winter Hive Preparations

Winter is just around the corner and there are some adaptations that can be accomplished now in preparation for the coming winds and cold season. Winterizing the hive can mean the difference between a strong hive coming into Spring or the loss of the hive over Winter. The first thing to do to help your hives is a bit of insulation sandwiched between the inner and outer covers. I had a half sheet of one inch foam insulation board lying around and cut pieces that just fit inside the outer cover. When placed on the hive, this helps to keep the hive temperature more constant since the bee heat rises and moisture condensing on the insulation does not seem to be as great as condensation on the inside of a non-insulated outer cover.

One inch foam insulation sandwiched between inner and tilted outer cover for illustration.

It's the moisture that kills the bees much more so than the cold. For several years, this added outer cover ceiling insulation alone seemed to make a big difference in my Winter hive survival rates. I would remove this sandwiched insulation in the Spring, once temperatures remained above freezing, and reinstall it in the Fall when temperatures once again consistently fell below freezing at night. One Summer it dawned on me that if the insulation helped mitigate the cold in the Winter, it might do the same for the heat in the Summer. So, the following Summer I left the insulation sheet in the outer cover through the season. This apparently cut down on the Summer bearding usually found on my hives during those very hot and humid days. This past Summer I did not even tilt the front edge of the outer cover up to increase the opportunity for ventilation and had almost no noticeable bearding with each outer cover having its own piece of one inch thick insulation.

Another method of insulation often suggested is to wrap and staple the outer walls of the hive with a heavy tar paper layer. I never did this, as removal of the tar paper in the Spring (I am told) nearly always results in the tar paper not being reusable, plus all the staples need removed. Over the 13 Winters of my beekeeping, there have been several Winters that have been very cold with temps staying near zero or below zero for a month or more. Club beekeepers recommended various commercial hive insulation blankets or simply two inch foam pieces cut to the size of the outer walls of the hive and strapped to the hive over Winter. The key to both of these is to be sure the bottom entrance and the top inner cover entrances are not blocked as the bees maintain moisture control through air circulation inside the hive during Winter. I use a Coroplast sleeve around each hive that I install as Winter temperatures begin to remain below freezing at night which is then removed when Spring temperatures start to remain above nightly freezing.

Control the Winter Hive Condensation

As noted before, it is the moisture that kills bees, not the cold. The next item I began using is called a Vivaldi spacer, also known as a quilting box. I think this made a bigger difference than any other insulation method I used. When I started using Vivaldi spacers over Winter, I began to have a 75 to 100% survival rate. Rather than purchasing a quilting board, which is another name used, one could simply cut a deep super into four equal spacers and drill four or five half-inch holes on each short side. A spacer can then be placed over an inner cover and under the outer cover insulation with several folds of burlap in the spacer to absorb moisture. The vent holes on each end of the spacer allow for enough circulation to evaporate most accumulated moisture. On only one or two occasions during Winter have I had to replace a very damp piece of burlap with a dry piece as a precaution. This normally occurs with a strong hive with lots of bees that seem to

A Vivaldi type spacer placed over the inner cover opening to absorb excessive Winter moisture. The outer telescoping cover sits over this.

maintain more activity than a smaller cluster. I usually install my Vivaldi spacers over my inner covers when I do my late Fall or early Winter last mite oxalic acid treatment.

If there is a mild period of several weeks during the Winter, the queen may begin to lay eggs which will generate a greater activity by nurse bees causing more condensation and greater use of stored food resources. This past Spring was a primary example of this, our March weather was milder, much more like that of our usual Aprils, while our April was more like our usually much colder March. As a result, queens started laying and brood was capped much earlier in March but as it became colder in April the queens were shut down with no apparent egg laying or brood capping for several weeks. Each year will be different and the beekeeper needs to make adjustments accordingly.

Oxalic Acid Mite Treatments

My article that appeared in the October 2022 issue of *Bee Culture Magazine* can still be found on the *Bee Culture* website. Type in "Bee Culture, Richard Wahl" and several of my previous articles show up. Go to the October 1, 2022 article, or go here: **https://www.beeculture.com/off-the-wahl-beekeeping/** and my oxalic dribble method is explained in greater detail in the latter part of the article.

I initially chose to use the dribble method as a mite treatment late in the year rather than the oxalic vapor method due to the simplicity of the necessary equipment. The reason for very late or very early treatments using oxalic acid is that either application method does not penetrate brood to reach mites under capped cells. Very early Spring or very late Fall is when the least capped brood is present in the hive. The vapor method requires a vaporizer heating tool, some type of electrical source to power the tool and a proper respirator mask that protects the user from acid vaporized fumes in addition to the small amount of oxalic crystals. For the new or hobby beekeeper this can be quite pricey. While the oxalic acid dribble method is a bit more time consuming and requires opening of the hives, the equipment necessary is considerably less expensive and other than an application syringe, is most likely readily available.

Currently the only legal oxalic acid crystal source is Api-Bioxal. The parent company, based in Italy, took the time and spent the funds necessary to research the use of oxalic crystals for the treatment of honey bee mites and provides the specific instructions for its use on their labeling. Since the oxalic amounts used are so small, other companies have not seen enough of a profit incentive to accomplish the testing, data collection and labeling requirements to sell oxalic crystals for the purpose of mite treatments as required by the EPA. Although there are some unregistered internet sites that may suggest other, less expensive sources, for oxalic crystals, this is ill advised due to the very small amounts being used. While Api-Bioxal sites show an 86% to 88% oxalic crystal content with the remaining "filler" being glucose and powdered silica other sources often show near 100% oxalic crystals. Due to the very small amount of oxalic crystals used, without the testing and labeling for the specific amount to use as a mite treatment, this percentage difference will change the resultant application strength which could be very detrimental to the bees. Randy Oliver, a well-known honey bee researcher, holds an EPA permit allowing him to do research to explore other oxalic treatment options. As an aside, he found that the oxalic dribble method has a slightly greater efficacy than the vaporization method. This is shown in an October 2022 webinar presented by the New York Bee Wellness organization which can be found in a YouTube video titled Randy Oliver's Latest Work, October 25, 2022 (**https://youtu.be/w_fjSiPi6g0?si=Opqo3K-ZgHjOMtEr**). This finding reinforces my decision to prefer the dribble method over vaporization. The article titled "Beekeeping and the EPA" in the September 2023 issue of *Bee Culture Magazine* elaborates the problems associated with getting new, greater efficacy and/or less costly methods of mite treatments legally made available to beekeepers with the necessary approval from the EPA.

In summary, a few late Fall or early Winter preemptive actions taken by the beekeeper can go a long way toward the potential survival of one's hives through the coming Winter. Taking into consideration your particular environment, experience level and state of your hives will enhance your beekeeping success and provide a basis for future year's adjustments. That assumes one is using some method to note taking to record current observations for use as future reference. BC

Winter will soon be here. My hives before I began using Coroplast sleeves, not nearly as important as the sandwiched insulation under the outer cover.

Listen along here!

Chemical-Free Yellow Jacket Removal

A Valuable Service Beekeepers Are Uniquely Suited to Perform

Beekeepers have a tendency to be honey bee centric. Have a swarm hanging from a tree in your yard? We'll be right over. But call a beekeeper to remove a yellow jacket nest and we're typically not interested. This leaves the person calling for help in a conundrum: do they call a professional exterminator or save money and pick up a can of toxic pesticide bug spray at the hardware store and attempt to do the job themselves? I would suggest that when we pass up the opportunity to help a member of our community with a yellow jacket problem, we fail to show that we beekeepers are more than a one-trick pony and demonstrate the varied benefits beekeepers can bring to the community. We also forfeit the chance to help prevent the introduction of additional toxic pesticides into the environment, and we give up on a potentially profitable service that can help diversify our income.

As beekeepers, we are already conditioned and equipped to deal with stinging insects. While different in many ways, yellow jackets are surprisingly similar to honey bees. While yellow jackets are carnivorous and will eat insects both dead and alive, they also feed on fruit, nectar and honeydew. Their stingers are barbed like a honey bee's, but the barbs are so small that they can typically sting repeatedly, and only occasionally does a stinger become lodged and pull free of the wasp's body. Yellow jacket venom, like most bee and wasp venoms, is primarily dangerous only to those who are hyper-allergic. Thankfully, the protective clothing that protects you from bee stings will also protect you from yellow jackets.


Ross Conrad

Yellow jackets are social wasps and participate in cooperative brood care. The yellow jacket queen is larger than the workers and is tasked with doing all the work to build and provision a nest on their own in Spring. Once the first litter of worker wasps reach maturity, they take over the nest building and food gathering duties. Like honey bees, male yellow jackets are haploid and females are diploid allowing female worker yellow jackets to lay eggs that develop into males.

While yellow jackets build nests of hexagon shaped combs similar to honey bees, they construct their nests by chewing naturally occurring wood fibers that when mixed with their saliva becomes a pulpy substance they are able to form into comb. A grey paper envelope surrounds the combs that make up their brood nest. Like honey bees, yellow jackets produce warning pheromones which suggest that smoke can aid in dealing with them.

There are several types of yellow jackets and they are all black with either white or yellow markings. The most common have yellow markings on their face, thorax and abdomens and they make their nests either in the ground or up in trees, under the eaves of roofs, or other above ground structures they deem suitable. The yellow jackets with white markings on their face, thorax and abdomens are often called bald-faced hornets. This is a misnomer since all yellow jackets (whether they have yellow or white markings) are technically wasps identified by the fact that they have narrow waists connecting their thorax to their abdomen.

Of all the stinging insects normally found in North America, the bald-faced hornet's sting seems to hurt the most. This is perhaps because the bald-faced hornet is larger and therefore has a larger stinger and venom sack. The bald-faced hornet also has a unique defense in that it can squirt or spray venom from the stinger into the eyes of nest intruders causing immediate watering of the eyes and temporary blindness.

Yellow jackets tend to be more defensive than honey bees especially in late Summer/early Autumn when their food sources are becoming scarce and their nest size is at its maximum. Beekeepers often will see yellow jackets attempting to access honey bee hives at this time of year. While strong colonies are able to resist the advances of yellow jackets effectively, the size of the entrance of a hive can be reduced to help weaker colonies defend themselves. Since late Summer and early Autumn is the time of year when yellow jackets become more noticeable, it is when they are more likely to cause problems for people and elicit complaints from the public who then may look for a local beekeeper to deal with them.

When removing a yellow jacket nest, it is best to do the job at night. Most of the time, just like honey bees, yellow jackets will all have returned to their nest for the evening since they are unable to navigate safe flight activity without the aid of light. As a result, a yellow jacket nest that is disturbed at night will trigger the guard wasps to crawl out of the nest to defend the colony. Like ants, bees and yellow jackets will crawl all over the place, but they will not fly unless there is visible light to guide them. Also like honey bees, yellow jackets are unable to see the color red, so a red light will provide the wasp remover with a critical advantage permitting them enough light to see and work without allowing the yellow jackets enough light to take to the air.

For those with patience, a commercially available yellow jacket trap can be deployed. For those who prefer a faster method, an easy way to remove small, above ground nests is

to place a bag around the nest and pull the nest away from its anchoring point on whatever structure it is attached to. For larger nests, a hive tool or for really big nests, a spatula can be used to sever the connection between the nest and the structure while holding the bag directly under it so the nest will fall to the bottom of the bag. Since the yellow jackets are restricted to crawling, you will have three to four seconds to quickly close the bag and seal the opening by tying it off if it is plastic, or folding it down if made of paper in order to seal the wasps inside. The bag containing the wasps should then be placed inside another container, such as a garbage can with a lid, since they can potentially chew through the bag during the night.

For ground nesting wasps, the easiest approach is to smother the colony. A large sheet of plywood can be placed on the ground over the entrance area at night when all the wasps are in the nest. For uneven ground, a sheet or blanket with the edges rolled up or folded a bit, can be placed down first to act like a gasket and seal gaps along the ground preventing any wasps from finding a way out from under the plywood. It is a good idea to weigh down the plywood with a rock or cement block to help ensure a good seal with the ground surrounding the colony's entrance and to prevent a strong breeze from moving the plywood. The plywood should be left in place for at least a couple weeks to ensure all the wasps are dead before removal.

Face of a southern yellow jacket queen **(Vespula squamosa)**

For the entrepreneurially inclined, there are pharmaceutical companies that will pay for wasps gathered in a manner that preserves the integrity of the wasp venom, so they can be used to manufacture allergy medications. One company, Jubilant HollisterStier, will pay $800-$1,000 per pound for yellow jackets, and up to $1,400 per pound for rarer wasps and hornets (and you thought that a three pound package of honey bees for between $125-$200 was expensive!). Rather than remove the yellow jackets at night, this work should take place during the day so that primarily female worker wasps are collected since the males do not have stingers. A bee vacuum that collects the wasps uninjured is the perfect tool for the job, since the wasps must be flash frozen alive in order to preserve the integrity of the venom for pharmaceutical use. Since the frozen insects can be stored for up to 24 months, collections obtained from numerous nests can provide a potentially lucrative sideline. Be sure to contact the company you choose to work with ahead of time since they have specific protocols and instructions for wasp collection, storage, documentation and shipping.

It is unfortunate that yellow jackets are widely considered a nuisance. Without them, we would be overrun with harmful insect pests since to feed their young, the wasps kill large numbers of caterpillars and other insects that harm cultivated and ornamental plants. By including wasp and hornet removal services to their skills, beekeepers can add to the industry's social value and provide a valuable community service, while developing the potential for additional income streams all at the same time. BC

Two-year yellow jacket nest, with a one-gallon (3.8 liter) container for size reference. Collected by Alabama, USA, 2007. Dimensions are approximately 18 inches by 24 inches by 12 inches (46 cm by 61 cm by 30 cm). Source: Wikipedia

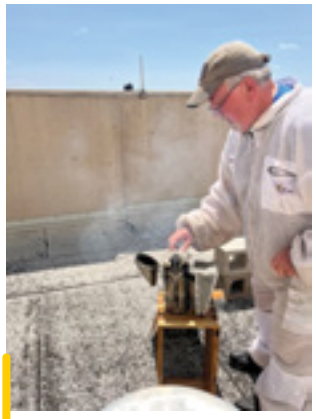
Ross Conrad is author of Natural Beekeeping *and* The Land of Milk and Honey: A history of beekeeping in Vermont. He will be speaking for the Western New York Honey Producers, Inc. in an event open to the public on November 18. Check out the calendar on page 94 for details.

Retired Schoolteacher Turned Beekeeper

Meaghan Airey

Package of 10,000 bees

Honey frame inspection mid-July



Lighting the smoker to calm the bees

In the heart of the bustling metropolis of Chicago, a flavorful and sustainable hobby has taken root. Meet Al Renslow, a 74-year-old native Chicagoan whose remarkable journey led him from the Chicago Public School classrooms to the serene world of beekeeping. Currently residing at The Admiral at **the Lake**, A Kendal **affiliate** and high-rise aging adult community in Uptown, Al is embracing retirement and is "buzzy" like a bee.

Driven by his curiosity for knowledge, Al, a retired schoolteacher, embarked on a journey of self-education in 2019. Guided by his beekeeping studies and his belief that we must be good stewards of the environment, Al discovered a calling for the next chapter of his life.

Al built a team at The Admiral at the Lake to support the project to bring honey bees to the Life Plan Community. Al and the Bee Buddies – fellow residents of The Admiral who were eager to join this engaging and educational endeavor – set up their first hives in 2021. With the help of his community, $3,700 in Garden Club funds were invested to purchase and set up a bee colony from the **Best Bees Company**, a Boston nonprofit.

The Admiral has always been a place where residents have felt empowered to pursue their passions. But Al took his passions to new heights when he thought to install the bee colony on the rooftop of the 31-story high-rise building that is The Admiral at the Lake. Against the backdrop of Uptown's skyline, the Bee Buddies transformed the top of the building into a haven for their beloved honey bees. Four wooden boxes hold 40,000 bees, expanding The Admiral's population by 160,000. City bees create exquisite-tasting honey due to the diverse native plants, and this unique honey can only be found within The Admiral's campus.

Word spread like wildfire as The Admiral's bees began producing their very own golden nectar from local flowers. Al's passion for beekeeping did more than yield sweet rewards – it catalyzed change within the community. Last season, over 400 bottles of urban honey were harvested, bottled, labeled and distributed with the help of The Admiral community members who reside in the memory care residences, fostering high community engagement as they volunteered to package the Bee Buddies' prized possession.

"Throughout the past couple of years, as we tended to the bees, we realized it represents much more than harvesting honey and nurturing the hives," shared Al. "These honey bees have taught us to nurture the relationships and bonds here at The Admiral."

Today, The Admiral Bee Buddies stand as a testament to the power of **lifelong learning** and engaging atmospheres as they finish their fourth beekeeping season. As The Admiral Bee Buddies tend to their hives, the story of Al Renslow, the retired schoolteacher turned beekeeper, who turned his personal hobby into a community-driven passion project, serves as a pillar of inspiration. BC

Bees and Women

Mrs. J.N. Heater

Nina Bagley

Some years ago, I came across an *American Bee Journal*; on the front page were five women who represented beekeeping. (*American Bee Journal* September 5, 1895, No.#36.) I recognized three of the women as if they had been old friends: Mrs. Harrison, Mrs. Axtell and Mrs. Wilson. I didn't know who the other two women were, hoping that I would find them someday, and someday finally happened. I was flipping the pages of my *American Bee Journal*. The date of this journal was December 21, 1893. Well, what a surprise, on page 779 was a picture and biographical article by Langstroth on Mrs. J.N. Heater; well, my persistence had finally paid off! I also found some information on Mrs. S. Sherman from Salado Bell, Texas, whose picture graced the center of the front page of the *American Bee Journal* 1895. I have identified all five women! So, I put Mrs. S. Sherman of Salado Bell, Texas, aside for now and decided to research Mrs. J.N. Heater's story; she was Nebraska's finest beekeeper.

Mrs. J.N. Heater was born Anna Eliza Case in Defiance County, Ohio, on March 5, 1855. Her father, Samuel Silas Sly Case, was born in 1821 in New York. He was a farmer. He married Nancy Poe Kepler on December 24, 1846, in Defiance, Ohio. They had fourteen children in twenty-two years. When Anna was young, her family moved to Niles, Michigan. The railroad service to Niles began in 1850, causing a surge in population. The village became a city in 1859. After several years on the farm, her parents moved to South Bend, Indiana. Like any child in Indiana, she would spend her days playing on the farm with her siblings.

Her father kept bees in the old way, in box hives on an extended bench. The box hive, also known as a plank hive, was merely a wooden box, usually taller than wide, sometimes built square, and always open at the bottom.

As a little child, she would remember kneeling on the grass at one end of the bench while she rested her head until she fell asleep.

At an early age, Anna was fascinated with bees and eagerly sought out any information about them.

She attended Mishawaka High School in Indiana, where she studied to be a teacher for three years. After high school, she took charge of a classroom at Mishawaka High School. Unfortunately, poor health brought her back home to South Bend. Being home with her family, she could rest and regain her health.

Her father ran a bookstore. She worked in the store for a year, helping her father. But her heart was in teaching, and she soon would return to the classroom again, teaching in St. Joseph County, Indiana.

In 1874, her parents moved to Nebraska. Anna would join them in 1876.

Anna met a gentleman named Jasper N. Heater in 1876. She continued her chosen pursuit of teaching for a year. She continued seeing Mr. Heater, and the two would be married. Anna would become Mrs. J.N. Heater on September 18, 1877. Her husband, Jasper, was a traveling salesman. His territory was the southwestern states, and his entire time was spent on the road! Anna failed to realize that once she was married, her husband's job as a traveling salesman would keep him away from home. This once-active woman was getting bored, and every day of living became extremely repetitious to Mrs. Heater. So in 1881, she purchased seven colonies of bees. She was twenty-seven years old. Fourteen new bee colonies were added to her apiary in the Fall of 1881.

The following Spring was a success! Her apiary was named "Eureka Apiary". Over the next ten years, she would increase her hives to a hundred and fifty colonies. Mrs. J.N. Heater had built a good name for herself. She replied to the questions sent to *Gleanings in Bee Culture* and was on the "Question-Box" staff of the *American Bee Journal* for many years.

Mrs. Heater was well versed as a writer. Her name graced the pages for years in the late 1800s for *Gleanings in Bee Culture* and the *American Bee Journal*.

She bred Italian queens and owned and operated a beekeeping supply house. She sent out catalogs with a price list to her customers. She would personally oversee every branch of her business. Mrs. Heater was very hands-on. She shipped queens, bees, honey and equipment to all parts of the west. Mrs. Heater was a very busy lady! She embarked on the company as a source of employment since her husband was away from home most of the time working. Her business was a thriving success.

Mrs. Heater was an officer and an active member of the Nebraska Beekeeping Association, honored many times by the society for her work. She was a lifetime member of the North American Beekeepers Association. She had the best exhibit of bees and honey for many years at the Nebraska State Fair. Her bees and honey displayed at the 1893 World's Fair were among the best!

Mrs. Heater's sweet voice was charming; she enjoyed the distinction of being the "Bee Queen of Nebraska."

Her favorite time was with her husband. They spent seven weeks at the Chicago World's Fair in 1893. She found the beekeepers in Chicago to be very genial, just like those in the state where she and her husband resided.

Mrs. Heater and her husband attended the North America Beekeepers Convention in Lincoln, Nebraska, on October 7 and 8, 1896. At the meeting, Mrs. Heater's paper on "The Past and Future of Bee Culture" was said to have been a highlight of the day. A.I. Root had a professional photographer take the NABA photo before the Lincoln building in 1896 (Photo of the Association to the right is from *Gleanings in Bee Culture,* January 1, 1897, page 10).

Although they never had children, their home was in Columbus, Nebraska, located five blocks from the railroad depot and always open to visitors – especially to all beekeepers! When Mrs. Heater and her husband went to Kansas City to spend the Winter, she was apparently in good health, but on March 13, 1897, the news was received that Mrs. Heater passed away in the early morning; she was forty-one. Her remains were sent back to Nebraska. It created a great shock throughout the community, where she was well loved and well known by all! It was reported that Mrs. Heater underwent an operation on her appendix at the German hospital in Kansas City. She received too much anesthesia and couldn't come out of it. She was in a foggy way. Mr. Heater was sitting with his wife and asked her if he sang to her, would that help her go to sleep? She nodded her head yes. So he proceeded to sing to her while she went to sleep, and sleep she did.

North American Beekeepers Convention, Lincoln, NE. Mrs. J.N. Heater, far left, bottom row standing up. A.I. Root, front row, middle, wearing a white coat. Photo from* Gleanings in Bee Culture*, January 1, 1897, page 10.

Mr. Heater had just sung his wife to death. She passed away at 4:00 am. Mrs. J.N. Heater was one of Nebraska's largest beekeepers for her time. Her friend Mrs. L. Amos said, "None knew thee but to love thee."

Anna's husband would grieve for years to come. He would eventually remarry years later, in 1920, to a woman sixteen years younger than himself with the same first name as his first wife, Anna. Her name was Anna L. Broaden; she was a widower with no children, a simple woman who kept the house. Jasper N. Heater died in 1931. He was seventy-seven years old. Fifty-four years had passed before he joined his first wife, Mrs. J.N. Heater. Mr. Jasper N. Heater was buried next to his first wife. His second wife, Mrs. Anna L. Heater, would be buried next to her husband, who died in 1899. She lived to be seventy-seven years old.

"Remember me always," —Mrs. J. N. Heater, 1897 BC

The* American Bee Journal *December 21, 1883


AMERICAN BEE JOURNAL. 779

BIOGRAPHICAL

No. 61.—Mrs. J. N. Heater.

Again we are afforded the pleasure of presenting to our readers one of apiculture's successful and prominent lady devotees, in the person of Mrs. J. N.

MRS. J. N. HEATER.

Heater, of Nebraska. For some time she has replied to queries for the BEE JOURNAL, hence the name is well-known to our readers.

We had the good fortune to meet her, as well as her husband, at the Chicago convention last October, and we found them to be very kind and genial—just like the rest of the bee-keepers in the State where they reside.

The Nebraska Bee-Keeper, some time ago, contained a picture and short biographical sketch of Mrs. Heater, a portion of which we have used in preparing this.

Mrs. Heater was born in Defiance county, Ohio, on March 5, 1855. Her father kept bees in the old way, in box-hives on a long bench, and when still a little child it was a very common occurrence to find her kneeling on the grass at one end of the bench, with her head resting on the same—sound asleep. To watch the bees at their work ever had a fascination for her, and in after years she eagerly sought whatever information she could gain concerning them. In fact, Mr. Heater says that his wife has never yet found anything in print relative to snakes, nuts, spiders or bees, but what she has given it a careful reading.

We learn that one of the pleasantest memories she had to take home with her from her seven weeks' sojourn at the World's Fair, was the pleasure of meeting so many genial fellow bee-keepers. Mr. and Mrs. Heater have in view still another treat for this winter—that of visiting the Mid-Winter Fair, in San Francisco, and taking a tour through the States of Washington, Oregon and California.

Mrs. Heater's maiden name was Anna E. Cass. She moved with her parents from their Ohio home to Niles, Mich. After several years spent on a farm near the latter place, the family moved to South Bend, Ind. Her life up to this time was passed much as is the life of any farmer's child, until she entered the high school in Mishawaka, Ind., and where she finished her career of instruction three years later.

She then took up the rod and cudgel, and assumed control in the school-room in one of the city schools of Mishawaka. Her health failing, she was obliged to resign and return to her home at South Bend, where, after regaining health, she entered her father's store as bookkeeper. Preferring the school-room, however, she soon found herself again

Nina Bagley
Ohio Queen Bee
Columbus, Ohio

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Whether we like it or not, YouTube is drawing people into beekeeping by droves and it's where most new beekeepers are going for information on how to keep bees. Is this hurting or helping?

YouTube was launched in 2005 and is now the largest video-sharing platform and the second largest search platform where people search for answers. Over 122 million people visit YouTube every day. Over a quarter of the world's population uses YouTube at least once a month. Whether you want to bake the perfect bread, master a musical instrument or start beekeeping, there is a video on that. I recently fixed my own clothes dryer by watching a video on YouTube.

Beekeeping has seen a surge in popularity, thanks in no small part to the abundance of beekeeping content on YouTube. Anyone can start a YouTube channel and begin publishing videos and those of us who do are known as content creators. Beekeeping has a plethora of content creators in the niche of beekeeping and in full disclosure, I am one. I've been publishing beekeeping content on YouTube since 2008. But the question remains: Is YouTube hurting or helping beekeeping?

YouTube can be a double-edged sword for beekeeping. While both enthusiasts and experts in beekeeping use this platform carefully and scientifically to share accurate beekeeping information, there is the risk that others may not possess those same skills and could potentially spread misinformation and misconceptions.

The Pros of YouTube for Beekeeping

Convenience of Information: Beekeeping information abounds on YouTube, making it accessible to anyone with an internet connection or a smart phone. Beekeeping tutorials, hive management tips, honey extraction techniques and what to do next are readily available.

Visual Observation: Beekeeping is a hands-on activity. Visual content on YouTube allows new beekeepers to observe techniques in action, such as inspecting a hive, when to add a super, how to deal with mites, and harvesting honey. This visual aspect can greatly aid comprehension, especially for those who are tactile learners.

Fostering a sense of community: YouTube fosters a sense of community among beekeepers. My viewers love to engage with me and each other in the comments section of my videos, asking questions and seeking my advice. This sense of connection can be invaluable, especially for those who are geographically isolated from other beekeepers or mentors.

Inspiration to Start: YouTube is a huge source of inspiration for many prospective beekeepers. Watching successful beekeepers tend to their hives and enjoy the fruits of their labor can motivate individuals to embark on their own beekeeping journey.

The Cons of YouTube for Beekeeping

Misinformation: Not all beekeeping content on YouTube can be trusted to be accurate or up to date. Misinformation can easily find its way onto the platform, leading beginners astray. Beekeeping is a science, and inaccurate practices can harm bee colonies and cost the beekeeper hundreds of dollars from hives failing.

Lack of Depth: Beekeeping YouTube videos often provide a superficial overview. Without a foundational understanding of bee biology, new beginners can be misled. These videos are often a brief overview, heavy on entertainment and often light on education. Beekeeping is a complex skill that requires in-depth knowledge. Relying solely on beekeeping videos may leave new beginners with gaps in their understanding, potentially resulting in poor hive management and unsustainable practices. Occasionally, beekeepers choose not to take a formal beekeeping class and simply rely on watching YouTube videos. They playfully refer to themselves as "YouTube Certified Beekeepers."

David Burns

Is YouTube Helping

Lack of Practical Experience: Beekeeping is science, but it is as much about intuition and hands-on experience as it is about theory. While videos can provide theoretical knowledge, they can't replicate the hands-on experience of handling bees, reading their behavior and making real-time decisions in the apiary.

Overconfidence: Over-reliance on beekeeping videos can lead to overconfidence. Beginners may believe they have mastered beekeeping simply by watching videos, when they lack the practical skills and judgment required.

The Balanced Approach: Learning from YouTube and Beyond

The question of whether YouTube is good or bad for beekeeping is complex. It's not an either-or situation. YouTube can be a valuable resource for aspiring beekeepers, but it should be just one tool in their learning arsenal. Here's how to strike a balance:

Start with the Basics: Begin your beekeeping journey by watching introductory videos to grasp the fundamentals. Learn about hive components, bee biology and safety precautions.

Diversify Your Sources: Don't rely solely on one YouTuber or channel. Seek out content from multiple reputable sources to ensure a well-rounded education.

Supplement with Books and Courses: Books and beekeeping courses offer in-depth knowledge that YouTube may lack. Consider investing in a few authoritative beekeeping books and online courses to complement your learning. (*Bee Culture* has a list of a few good books for all levels of beekeeping for a place to start: **https://www.beeculture.com/best-books/**)

Join a Local Beekeeping Association: Locally based beekeeping associations or clubs can provide hands-on experience, mentorship and a sense of community. They often organize practical workshops and apiary visits.

Practice, Practice, Practice: Ultimately, beekeeping is learned by doing. Once you've absorbed theoretical knowledge, get your hands dirty in the apiary. Start with a mentor if possible, or with a small, manageable hive.

Continual Learning: Beekeeping is a constantly evolving field. Stay updated on the latest research, best practices and innovations in beekeeping to ensure the health and productivity of your hives.

Critical Thinking: Develop a critical eye when watching YouTube tutorials. Question the information presented and cross-reference it with other trusted sources. If something seems too good to be true, it probably is.

In conclusion, YouTube can be both a blessing and a curse for aspiring beekeepers. It offers accessibility, visual learning and a sense of community but can also spread misinformation and foster overconfidence. The key is to approach YouTube as a supplement to a well-rounded education in beekeeping. By combining online resources with practical experience, mentorship and a commitment to ongoing learning, you can reap the benefits of YouTube while ensuring the welfare of your bees and the sustainability of your beekeeping practice. Beekeeping is a skill that requires dedication, patience and a deep respect for the bees, and this should be the guiding principle for all beekeepers, both new and experienced. For more on this subject, watch my video on this subject at: **https://www.honeybeesonline.com/davids-youtube-channel** BC

or Hurting Beekeeping?

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Figure 1. Office Building

Keeping Bees at Work:
Lessons Learned from an Office Rooftop

Jeff Lisenby

As the world emerged from pandemic restrictions in late 2021, the management team at ProAssurance Corporation in Birmingham, Alabama, began making plans for employees to return to in-office work. Many employees had come to prefer working from home, and our team recognized a need for creative ideas to make the office a more interesting and attractive place. I am the General Counsel at ProAssurance, and having enjoyed keeping bees at my home for several years, I suggested that we might establish an apiary on the roof of our building and offer employees an opportunity to learn about beekeeping at work. The management team supported the idea and decided that the company would pay the costs associated with placing and maintaining two beehives on the roof of our office building. This article will summarize our experience with the project, which proved to be a great success.

Figure 2. PRA apiary in July 2022

Setting the Stage

ProAssurance is a specialty insurance company with approximately 250 employees in Birmingham and a total of 1,000 employees spread across the country. We are a public company whose stock trades on the New York Stock Exchange under ticker symbol PRA. Our primary business is providing professional liability insurance to physicians, hospitals and other healthcare providers, covering claims by third parties asserting medical malpractice. The company owns the building where the corporate headquarters is located. It is a seven-story structure situated about five miles south of downtown Birmingham. Within the three-mile radius surrounding the office are the leafy and flowering residential areas of Homewood, Mountain Brook and Vestavia Hills as well as the Birmingham Botanical Gardens, the Birmingham Zoo, and three country clubs – perfect foraging territory for honey bees!

January-February 2022 – Laying the Foundation

As the company's lawyer, I considered the potential legal issues associated with the project:

- The company owns the building, so landlord approval was not necessary.
- The local city attorney confirmed no special rules or ordinances governing beehives on commercial property in our municipality.
- We consulted with workers' compensation and general liability carriers and confirmed that the company would be covered for any claims by employees or visitors asserting injury caused by the bees (and interestingly the general liability carrier made a point of advising us that there would be no coverage for claims of injury caused by consuming honey from the hives!).

- We examined the roof surface and reinforced the area underneath the hive stand with concrete pavers.
- Fire safety consideration (due to using smoker on the roof) – We confirmed the presence of a fire extinguisher in the stairwell leading up to the roof and bought a small metal trash can with tight-fitting lid to store the hot smoker after inspections and smother the smoldering fuel inside.
- Medical safety concerns – We considered whether to maintain an epi-pen on site and concluded that, because a major hospital is located literally right across the street from our building, we would rely on calling 911 in the event of a medical emergency caused by a sting.

March 2022 – Prepping People and Equipment

We bought a wooden hive stand and ten-frame equipment for two colonies, with the base brood nest configuration being one deep plus one medium. We also bought full protective gear for four people plus veils and gloves for eight more. For teaching purposes, we decided to install one nucleus colony and one package of bees, and we reserved each with local suppliers. I conducted a series of employee information sessions about bees and beekeeping, which attracted about 50 participants.

April 2022 – Setting Up the Apiary

Monday, April 4th, was the big day! A team of about 15 employees installed the bees in their new home on the roof. We situated the hives facing due south, and the exterior building wall provided a slight wind break to the north. Weekly inspections throughout the month of April confirmed a healthy brood pattern in each hive, and the bee population expanded steadily. Both colonies were fed with light sugar syrup (one part sugar to one part water) until they filled the first medium box, then we stopped feeding and added honey supers.

May-June 2022 – Thriving Colonies and Honey Harvest

The rooftop environment proved to be ideal for honey bees, with full sun from dawn to dusk. The roof surface also disrupted the life cycle of small hive beetles, which normally thrive in the warm and wet Alabama climate. The nucleus colony grew especially quickly and produced sufficient honey to justify harvesting one medium super (which yielded about 25 lbs of beautiful, light, Spring honey) as a reward to all the new beekeepers for their work diligently caring for the bees.

July-August 2022 – Colonies Reach Maximum Size and Second Honey Harvest

As the colonies continued to grow, we added supers with upper entrances (¾" holes drilled in the face of the boxes). As the hot Summer dearth arrived, honey supers were almost full on both hives, which was remarkable for colonies that were brand new just three months earlier. We harvested an additional three medium supers, bringing the total first year harvest to over 100 lbs. Following the harvest in early August, we treated each colony with 25g of Apiguard each week for four weeks. This varies from the usual treatment regimen (two doses of 50g spaced at 14 days) but is common for Summer use of Apiguard in Alabama due to high temperatures. The mite drop was moderate in each hive.

September-November 2022 – Winter Preparation

To prepare for Winter, we reduced hive space to one deep and one medium for each colony and fed concentrated ProSweet syrup (two gallons fed to each colony).

December 2022 – Hard Christmas Freeze

Birmingham experienced an unusual 72-hour period of continuous subfreezing temperatures from December 23-25, with a low of nine degrees Fahrenheit on December 24. We worried that the extreme cold and wind on the roof might prove too much for one or both colonies, but when temperatures rose into the mid-40's on December 27, both hives were active with "cleansing flights."

January 2023 – Winter Mite Treatment and Mead Making

Both hives were treated with oxalic acid vapor three times spaced at one week per treatment. The mite drop was heavy. We also passed some

Figure 3. PRA apiary in September 2023

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Figure 4. ProAssurance Honey

of the cold Winter days by trying our hand at mead making.

Spring 2023 – Celebrating a Successful First Year!

Both colonies survived the Winter, so the project was deemed a great success in its first year. We used Formic Pro to treat for mites in April, and the mite drop was low to moderate. One colony grew especially strong and as of May 2023, had three full honey supers above the brood nest. The second colony exhibited sluggish growth and poor brood pattern, so we replaced the queen. The replacement queen seemed poorly mated, also producing a poor brood pattern, and thus we requeened a second time. This queen produced an excellent brood pattern, and the population grew steadily, but I advised our beekeeping team not to expect surplus honey from that hive this season.

Summer 2023 – Honey Harvest and Mite Treatment

By the end of June, the hot Summer nectar dearth had set in, and we decided to harvest honey from the strong, overwintered colony. Three medium supers yielded about 75 lbs of amber honey. We were pleased with this result given the queen problems we experienced with the second colony and the fact that the 2023 weather pattern generally resulted in average to subpar honey production among beekeepers in our area. In August, we again treated with half-doses of Apiguard (25g per week for four weeks) and observed moderate mite drops in both hives.

Fall 2023 – Looking Ahead to Another Winter

As of late September, we have reduced one colony to the Winter configuration of one deep plus one medium. The second colony, which was successfully requeened in late May, has not yet shown much decline in population, so we might allow it to overwinter with two medium boxes plus one deep rather than attempt a Fall split. Following our first pre-winter feeding on September 19th, each colony consumed a quart of light (1:1) sugar syrup in less than 24 hours, and we plan to feed ProSweet syrup heavily through October and into November.

Conclusion

Aside from the success of the beekeeping operation, the project has been an enormous success in terms of employee engagement and enthusiasm. Approximately two dozen employees in Birmingham have been regular participants in hive inspections and mite treatments, with even more showing up for special occasions like honey harvesting and mead making. We have provided periodic updates by email to employees all around the country, and reaction was strongly positive. Employees from outside Birmingham who come to the home office on business often ask to visit the "Rooftop Bees" while they are in town. And of course, the honey has been a coveted treat that we've been pleased to share with employees, members of our Board of Directors and visitors. The project has exceeded expectation in bringing our people together, and we are looking forward to continuing to nurture our bees for years to come! BC

Vets Are Required For Bees

Sanchi Singh

Which animals comes to mind when you hear the word "veterinarian"? Probably a cat? Or a dog? Veterinarians work with a wide range of animals. The honey bee is one of the most recent species. The Food and Drug Administration (FDA) passed the veterinary feed directive in 2017 (VFD). When utilizing a VFD medicine, like as an antibiotic in animal feed, producers must consult with a professional veterinarian. This pertains to beekeepers since, while being insects, bees can have diseases just like our other veterinary species.

This ruling went into full effect in January 2017. Honey bees will now be treated as animals and will get veterinarian care. While many beekeepers will find the change tough, it will have some positive consequences. First and foremost, this will safeguard the use of the antibiotics. This is critical not only for our health, but also for the health of our bees. More prudent use will extend the life of the medications we have and will benefit future beekeepers. Second, as more veterinarians become trained in honey bee diseases, there will be a greater number of people who can diagnose, advise and comprehend honey bee diseases more effectively.

How does it work?

1)A veterinarian who is authorized to operate in the state where the beekeeper is located must issue an order, either a prescription or a Veterinary Feed Directive (VFD), if the beekeeper needs a specific medication.

2)The veterinarian has sufficient knowledge to initiate at least a general or preliminary diagnosis of the animal(s) medical condition.

3)A veterinarian is only permitted to give instructions to patients with whom they have a veterinary-client patient relationship, commonly called a VCPR.

4)When using antibiotics, the beekeeper must always follow the instructions given by the veterinarian and on the label for the effective bee care.

Where are the challenges?

The challenge lies in the numbers. There are simply not enough resources to cater to the 150,000 beekeepers in the U.S.

- Over the last 60 years, the population of honey bee colonies in the United States has continuously fallen, from six million colonies (beehives) during 1947 to four million in 1970, three million in 1990, and to 2.5 million now.
- Since 2006, commercial beekeepers throughout the United States have witnessed honey bee colony loss rates grow to an average of 30% per Winter, compared to historic loss rates of 10 to 15%.
- Beekeepers in the U.S. have cumulatively lost around 10 million beehives, worth an estimated $200 each. Because of the high colony loss rates, commercial beekeeping is at risk as well as endangering crops that rely on honey bee pollination.

What does it mean for the beekeepers?

Beekeepers must collaborate with veterinarians for maintaining the health of the bee colonies. If a beekeeper wishes to treat their hive with antibiotics, they should first consult with a veterinarian. The vet can give medications for the bees after analyzing the hive's condition. This means that the bond between veterinarians and beekeepers has only become stronger.

What are the resources available?

- USDA-National Veterinary Accreditation Program: The Role of Veterinarians in Honey Bee Health
- The Honey Bee Veterinary Consortium

Some universities have also compiled helpful information for veterinarians such as:

- University of Arkansas – Honey bee health guide
- University of Florida – Webinar: A Veterinarian's Guide to Honey Bee Antibiotics
- VFD films from Maryland (The first 12 minutes of this video are done by Dr. Michael Murphy of the FDA, who describes the various antibiotics available. The remainder focuses on American Foulbrood identification and honey bee biology.)
- Oklahoma State Guide on the Veterinary Feed Directive (Extralabel Use in Minor Species)

Honey Bee Photo by Michael Milverton on Unsplash
Vet Photo by Getty Images

Going For A Ride

How Bees Carrying Fungi Are Protecting Agroecosystems Part 2

Charlotte Coates[1], D. Susan Willis Chan[1], Erica Shelley[1,3], Saira Espinosa[2], Peter Kevan[1]

Part 1 of this article was originally published in the August 2021 issue. If you missed it or would like a refresher, scan the QR code to the left or go to https://www.beeculture.com/going-for-a-ride/

Can you imagine a world where bees are working with farmers to protect food crops from pests and disease? The exciting potential of apivectoring (the use of bees to transport beneficial particles) provides a new role for bees and beekeepers in agriculture.

As bees industriously labor, carrying pollen from flower to flower, they also act as vectors, transporting other living microscopic particles. These hitchhikers can be harmful, such as plant or insect pathogens. However, the bees can also carry beneficial fungi and improve the health of the plants they visit.

Many microscopic natural competitors or predators, known as biological control agents, are used to control pests in both conventional and organic farming systems. These biological control agents can be formulated in a powder designed to adhere to bees temporarily. As the bees visit a flower to gather pollen and nectar, the powder falls and can combat any unwanted insect pests or disease organisms that may be living on the flowers or leaves. The use of biological control agents is increasingly popular as they provide an alternative to pesticide use, reducing the likelihood that pest populations will become resistant to chemical pesticides.

Compared to conventional applications such as spray or dusting, apivectoring offers an incredibly efficient way to distribute biological control agents to flowering crops as the bees deliver directly to the flower, which eventually becomes fruit (Figures 1 and 2). Apivectoring can be used in any bee-pollinated crop system and, of course, provides the layered benefits of pollination to the crop, improving both the health and the yield of the crop. Which type of bee is best suited for the apivectoring (e.g. honey bees, bumblebees or mason bees) depends on many factors, including the type of crop, field or greenhouse conditions, and/or temperature at blooming. The research will continue to expand and explore options for a multitude of crops. Already successfully tested and used on orchard, berry, vegetable, seed and oil crops, the possibilities for apivectoring are numerous[2].

The first step in successful apivectoring is to choose a living natural competitor or predator that targets the pest in question. The pests and diseases controlled by apivectoring are molds, bacteria and insects that live in or on the flower or fruit where the bees deliver the biological control agent. The biological control agents that target insect pests are known as entomopathogenic. Others, known as fungal or bacterial inhibitors, occupy space on the plant, preventing harmful phytopathogens from establishing on the flower or leaf.

Bee-delivered biological control agents are diluted into a powder formula that can consist of many ingredients, chosen specifically for the health of the bees and the pest that is being targeted. The concentration and particle size of the powdered formula are optimized to control the pest and enable the bees to carry it easily. Additionally, if the particle size is too small, bees may asphyxiate. If they are too large, particles will not adhere to the bees' bodies. Diluting commercially prepared biological control agents

[1]University of Guelph, Guelph, Ontario, Canada
[2]Universidad Nacional de Colombia, Bogotá, Colombia
[3]Best for Bees Ltd., Kitchener, Ontario, Canada

Figure 1. A honey bee vectoring biological control agent to a strawberry flower. Photo credit: Lorne McClinton, used with permission.

Figure 2. The development of a strawberry from flower to unripened fruit. The process begins with pollination of the flower by bees and/or wind. Grey mold spores can infect the flowers causing the fruit to rot as it develops and matures. Biological control agents can prevent grey mold spores from infecting the flower. Photo credit: Lorne McClinton, used with permission.

Figure 3. Dispenser for a honey bee hive showing the exit where the biological control agent is picked up by the bees and the entrance where they enter the hive without contacting the biological control agent. The dispenser slips into the front of the bottom board. Photo credit: Beatrice Chan, used with permission.

Figure 4. Small veils are put around strawberry flowers to prevent access by the bees. This creates a control treatment where no biological control agent is delivered. We can then compare disease prevalence in the untreated control with the unveiled flowers that are treated with a biological control agent to determine if the biological control agent works. Photo credit: Susan Willis Chan, used with permission.

is necessary if concentrations of the agent provided by the manufacturer are too high and may impact the bees' health[4]. Vegetable-based powders such as corn flour are often used as a diluent. Further research into other types of additives could provide more options or improve the efficiency of delivery.

After preparation of the biological control agent powder, it is placed into a dispenser within the bee colony, pictured in Figure 3. The design of crop protection dispensers allows bees to contact the powder formulation as they exit the hive and avoid contact with the formulation as they enter. This two-way design provides maximum delivery of biological control agents to the crops while minimizing product loss. As they carry out their normal foraging activities, the bees carry microscopic particles which will be deposited on any flower they visit continuously throughout the flowering period.

Apivectoring research originally began in Dr. Peter Kevan's lab at the University of Guelph. In 2019, Dr. Kevan's lab expanded on the existing research on protecting greenhouse crops against thrips in Ontario by conducting the first trials on controlling insect pests on greenhouse strawberries[2,3,4,5]. The team changes the trays of the powdered fungal biological control agent *Beauveria bassiana* to control insect pests on greenhouse strawberries.

Starting in 2020, the Kevan Lab began a new apivectoring project using honey bees to control grey mold on field-grown strawberries on Ontario farms (**https://www.facebook.com/2020BeeVectoring**). The project measures how well the biological control agent controls grey mold, how far the bees can disperse it, and whether wild bees are picking it up inadvertently as they visit the strawberry flowers. These questions are answered by carefully taking flower and fruit samples in the field (Figure 4).

In addition, there's research on the construction and the design of dispensers to optimize the delivery for different types of bees and hives. A good design disrupts the normal movement of bees as little as possible, is easy and cheap to construct and store, and maximizes the delivery of the biological control agent.

Given the benefits of apivectoring to protect against crop pests without leading to pesticide-resistant populations, we will surely see more research solving some of the remaining challenges that are preventing apivectoring from reaching its full potential in both conventional and organic farming systems. To learn more, please contact the International Organisation for Biological Control (IOBC), the International Commission for Plant Pollinator Relations (ICPPR; **https://www.icppr.com/**), the Kevan Lab website or visit the 2020 Bee Vectoring page. BC

Research Acknowledgment

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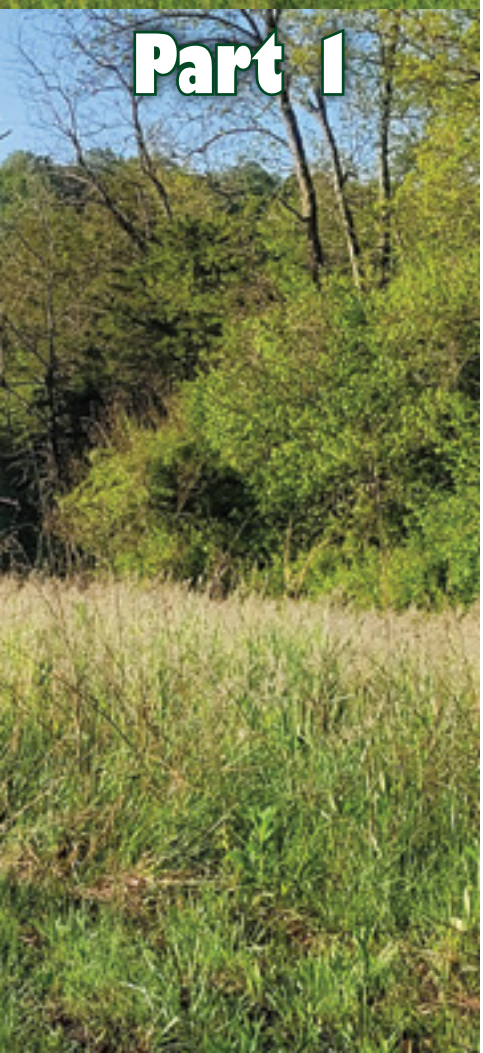
Getting By with a Little Help from My

A Pollinator Restoration Journey –

Jeff Kennedy

Friends

Part 1



The most recent census (2020) reflects that there are currently 274 million people residing in urban/suburban areas in the United States. These black holes (environmentally speaking) encompass roughly 50+ million acres of asphalt, with the bulk of the remaining acreage dedicated to grass, the largest irrigated crop in the continental U.S.

A study, published in the journal *Environmental Management*, found that over 40 million acres of land in the U.S. has some form of lawn on it. That equates to three times more than corn, or any of our other irrigated crops. In addition, our grasses are doused with environmentally harmful chemicals (fertilizers & pesticides) to keep them looking like the 18th hole at Augusta. They also require tons of water to irrigate them with supplemental water making up ¾ of the residential water usage. This year, Americans will spend about $30 billion on their lawns, money that I would argue could be used to support a much better cause.

Honey bees and native pollinators are facing unprecedented threats due to a widespread decline in available habitat and quality. The Bee Informed Partnership's annual Colony Loss and Management Survey reported that beekeepers in the United States lost an estimated 39% of their managed honey bee colonies for the calendar year of 2021-2022. This was the highest annual loss on record since they began compiling data roughly 16 years ago. Growing concern for pollinator health has stimulated research, educational initiatives, conservation-oriented management practices and habitat acquisition by federal, state, private and nongovernmental organizations to preserve and assist local populations with recovering.

In July 2020, we purchased 12 acres of rolling pasture that connects to our existing farm in southern Indiana. It is located along the luxuriant banks of Whiskey Run Creek, whose sweeping channels support a wide array of fauna. After acquiring the additional acreage, we refrained from having it commercially hayed, as had been done the previous 20 years. We wanted to see what plant species were never allowed to flourish on account of the vegetation being cut back two to three times per year.

In the re-growth, we were delighted to find large patches of common milkweed, sweet Joe-Pye weed and numerous other species of aster and goldenrod that regenerated. Although there were many desirable species, the bulk of the acreage, if not actively hayed or managed aggressively, would soon resprout and be dominated by Johnson grass, a highly invasive, non-desirable, introduced species. We bared witness to this as it took over the acreage during the growing season of 2020.

Without an immediate solution, we reverted to the same regimen that had worked prior (commercial haying) until we had satisfied the terms of our purchase agreement. One of the stipulations in the contract was that we could not make any amendments or alter the acreage until our agreement was honored. Being such an expansive area of sun fed, open grassland, we decided to pursue a restoration project for our honey bee colonies and other, local pollinators. This idle time permitted us the luxury of researching all aspects of site prep, seed mixtures and installation techniques, as well as developing a plan of action that would hopefully ensure our success.

Plan of Action

Our written plan was comprised of two phases. Phase 1 was the site preparation and continued observation and invasive species targeting. This began in late Spring/early Summer of this year when the grasses and forbs had started to break their dormancy. With the help of Neff Family Fertilizer (Salem, IN) we administered two rounds of glyphosate during the 2023 growing season. I still shudder after typing that, but ultimately, it was a necessary evil. Ella and I were both highly conflicted, but when trying to establish a high-quality pollinator habitat, roughly 90% of long-term success comes down to thorough site prep.

Aside from offering an initial "burn" of the vegetation that is present days after application, glyphosate spreads all around the plant and prevents it from making proteins that are necessary for its growth. This is what ends up killing the plant. Additionally, glyphosate is absorbed through the plant's tissue, with only tiny amounts of it being absorbed into the roots. Consequently, glyphosate is only effective at killing growing weeds and grasses and it cannot stop dormant seeds from germinating.

After the first application, we monitored the area of regrowth. The undesirable areas of Johnson grass received regular cuttings throughout the early Summer; however, fueled by the power of the steamy July sun, the acreage quickly got away from us and what was practical


The Bee & Butterfly Habitat Fund
Pollinator Habitat in Progress
Pollinator habitat can take 3-5 years to establish, but it is worth the wait!
BeeAndButterflyFund.org

to maintain with our Cub Cadet lawn tractor. With no other options to keep the Johnson grass from going to seed, a second broad-scale glyphosate application was administered at the end of July to knock down the growth that was lying dormant in the seed bed prior to the first glyphosate application. Additionally, a third application will occur in late Fall, just prior to our first hard frost.

Phase 2 will begin in early 2024 with a final glyphosate application occurring in early Spring, just prior to the seed installation. The seed install will be done by Davy and Amanda Hayden (Corydon, IN), a husband and wife team that shares a similar passion as Ella and I. Like us, the Hayden's both have careers outside of this field and do conservation/restoration work as a passion project on the side. Davy and Amanda possess the knowledge and expertise to operate the seed drill and to properly install our seed mix to the required depth of ⅛". The specialty drill will be on loan from our local USDA-NRCS office who has equipment available for rent to the public.

Our custom seed mix will be provided by the Bee & Butterfly Habitat Fund (BBHF). Their "Seed a Legacy" pollinator habitat program works with private, public and corporate landowners and managers to establish high-quality pollinator habitat at no cost to them while also providing one-on-one technical guidance. Their region-specific, custom seed mixtures help to improve the health of honey bees, monarch butterflies and other native pollinators in a 12-state region of the Midwest. Being located within the region, we applied for and received a seed grant. The BBHF is in the process of expanding their range into four more states with hopes of continually expanding until their services can be offered to residents in all fifty states.

We opted to go outside of the customary, USDA Conservation Reserve Program (CRP) seed mixtures as the NextGen Seed Mix that is provided in the BBHF "Seed a Legacy" program simply outperforms CRP and other commercially available pollinator mixtures. The BBHF spent the last six years researching the most optimum plant species for forage and their seed mixes are specifically designed for pollinators. Their optimum installation model is to plant the butterfly mix in the center with the honey bee mixture bordering it. As BBHF Executive Director, Pete Berthelsen puts it, "Think about a castle with a moat around it." The honey bee mix creates a natural, green barrier/fire break for when prescribed fire is utilized on your site.

Although we opted to not use the CRP seed mix, we did reach out to our local USDA Natural Resources Conservation Service (NRCS) office to inquire about possible funding for our project. I met with our District Conservationist, Kevin Chastain who assisted me with the resource possibilities and the grant applications for our project. We were excited to learn that in addition to providing benefits to our honey bees and local pollinators, our project would also fall under the umbrella of a newly announced "Farmers Helping Hellbenders" initiative. The Hellbender is the largest aquatic salamander in the United States and is listed as endangered in Indiana. The Hellbender project is providing funds for farmers to impart certain land practices that will prevent agricultural runoff and erosion to their land that borders watersheds emptying into the Blue River. The chemical runoff and erosion that occurs during heavy rain events make their way from these smaller tributaries into the Blue River, negatively affecting the habitat and its breeding population of Hellbenders that occupy the Blue's pristine waters.

Creating high-quality pollinator habitat in prior agricultural areas can be an intimidating concept that comes at a substantial cost for private landowners with limited budgets. What I hope to accomplish in this series of articles is to hopefully encourage others to embark on a similar journey on their land. I will outline the steps we have taken, assistance and resources that are available, the associated costs and the real time results on our acreage.

As I grow older, I am discovering that possessions mean little to me. What brings me the most joy these days is having a purpose, setting goals and working hard to achieve those goals. What I desire you cannot buy on Amazon and have shipped to your door. We are committed to our land and are anxious to see this plan through in its entirety. Robert Green Ingersoll once stated, "Hope is the only bee that makes honey without flowers." What a profound statement that is. Now more than ever, it is up to us to start acting and insist upon change. We may feel small, with little to offer, but every bit helps as, like our bees, the whole is greater than the sum of its parts. We must come to terms with what we have taken from the earth. The time is now. BC

Yellow Queen (yellow, large, adult)

Method to Evaluate the Parameter Phenotype of the Queens

Pablo Montesinos Arraiz

In routine inspections of the hives, beekeepers, whenever possible, look for the queen to make sure of her presence. With this, they check for the same queen and if its appearance is normal.

The objective of this method is to describe the queens based on phenotypic outstanding traits, and as quickly as possible, given their natural tendency of sneaking among the workers during the inspection of the hives and be surrounded and covered by bees. While some queens flaunt themselves, most of them scurry to corners and hide. Moreover, the beekeepers can damage the queens when trying to locate, observe and describe them.

In spite of the fact that many phenotypical measurements can be correlated to queen quality coming from genetic background, developmental conditions, mating success, beekeeper's management (Hoopingarner & Farrar, 1959; Oldroyd et al., 1990) body weight (Woyke, 1971; Szabo,1973; Szabo et al., 1987; Kahya et al., 2008; Delaney et al., 2011; Tarpy et al., 2011, Collins & Pettis, 2013); when beekeepers are inspecting their hives, they do not have in mind those correlations; they just want to see the queens and describe them. This method pretends to be a way to help beekeepers to do so and has no intention to establish any prototype, paratype or morphotype, nor to identify the race to which the evaluated queens belong.

In this method, the patterns of the parameter phenotype of the queens are defined through their particular physical traits in order to facilitate their description at the time they are observed during the inspection of the hives. The better the beekeepers have patterns to describe the queens, the sooner and more precise they will be able to do it.

The physical traits of the queens that are used in this method for their phenotypic evaluation have to do with the parameters race (according just to the color), size and age of the queens.

The patterns of these parameters are mainly related to the abdomen of the queens, since due to its dimension is the part of the body where are best appreciated. For the parameter race is considered the color, for the parameter age the color and the physical conditions of the wings and for the parameter size the length of the body from the head to the tip of the abdomen.

The parameter race is assessed through the variable color of the abdomen. The yellow and dark colors, and their variations in greater or lesser degree, are taken as references for the highest races recognized economic value in commercial beekeeping: *Apis mellifera ligustica* Spin, *Apis mellifera mellifera* L, *Apis mellifera carnica* Pollman, *Apis mellifera caucasica* Gorb and the Africanized honey bee. The hybrid queens coming from the crossing of these races are also evaluated in this method.

When the abdomen is 75% yellow or more, it is considered to be a yellow queen and dark if the color predominant is dark in the same proportion. A hybrid queen will have 50% yellow and 50% dark. Coloration may not be completely delimited because colors may be somewhat interleaved or overlapping but this does not prevent the definition of the proportion of colors.

The parameter size is obtained in relation to the variable length of

Black Queen (dark, small, adult)

Yellow Queen (yellow, large, old)

Hybrid Queen (hybrid, medium, adult)

Yellow Queen

Black Queen (dark, small, young)

the body, from the head to the tip of the abdomen. It is assumed 20 millimeters for large queens, 15 millimeters for medium queens, and those queens with lower measurement are considered small.

Regarding the age of the queen, it is inferred from the variables degree of brilliance of the abdomen and physical condition of the wings. The abdomen of the workers at birth is pale in color, not so that of the queens that are born with a slightly darker tone, regardless of the race, but in a couple of hours it darkens more and becomes bright. The shine of the abdomen is lost with age, becoming dull and finally discolored. The young queens have a shiny abdomen, the adults have it slightly dull and the old ones discolored. Wings integrity is also used as indicator of age; since in the old queens, they are usually gnawed by wear and rubbing with the worker bees when they move over the honeycombs. However, the nervous nature of some queens can incite the workers to bite the queens' wings, so adult or even young queens can be seen with their wings gnawed prematurely, and this condition can be erroneously attributed to the old age of the queen.

For the evaluation of the parameter phenotype of the queens, three levels in each pattern have to be considered to define the possible values that they can have.

Levels:

As observing a queen, the first thing that stands out is the color and brightness of the abdomen, then the size and age, likewise the codes that identify the variables color, size and

age are arranged. Beside the code that describe the queen Q, the other codes are written: Y= yellow; D= dark; H= hybrid; L=large; M= medium; S= small; Y= young; A=adult; O= old.

The phenotypic evaluation of the queens gives rise to twenty-seven possible combinations of the color, size and age patterns, nine combinations corresponding to each one (Figure 1).

When looking at a queen there may not be enough time to describe her three body traits, so only one or two variables can be reported. In those cases, the letter I is written instead of the variable(s), which has(have) not been determined (Figure 2).

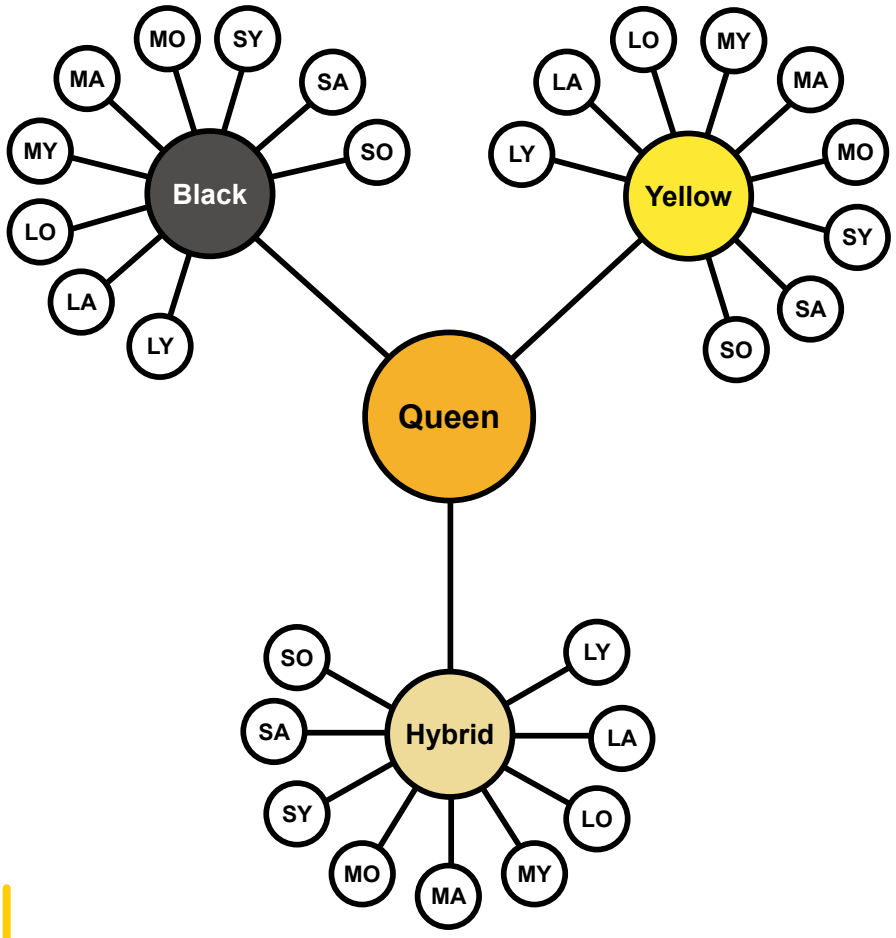


Figure 1. Combinations of the variables of the parameters race, size and age

QYLA	queen yellow, large, adult	**QDLY**	queen dark, large, young
QYLY	queen yellow, large, young	**QDMO**	queen dark, medium, old
QHSY	queen hybrid, small, young	**QDLA**	queen dark, large, adult
QHMA	queen, hybrid, medium, adult	**QDLO**	queen dark, large, old
QDSI	queen dark, small, age indeterminate	**QYSO**	queen yellow, small, old
QYII	queen yellow, size and age indeterminate	**QHLA**	queen hybrid, large, adult

Figure 2. Some queens descriptions that can be observed during hive inspections.

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FIVE MOST USEFUL ITEMS

Ed Simon

In the twenty plus years of building beekeeping equipment, I have designed, built, used and tried many things. Some of which were absolute disasters. The items described here are the ones on the opposite end of the scale. They are the ones I have found to be most useful. Each item will make your life easier, reduce your labor or just make beekeeping more enjoyable.

- Hive Body Jig
- Frame Jig
- Gargoyle
- Swarm Trap
- Extractor Motor Control

The hive body and frame jigs ease the construction of beekeeping woodenware. The gargoyle and swarm trap allow for smoother beekeeping operation and the extractor motor control solves a major problem for do-it-yourself-ers who have built their own extractor and are tired of trying to hold their motor at a constant rpm.

When I decided to build my own equipment, I realized to be compatible with other providers equipment, all the boxes and frames needed to be square and of consistent size. The reliance on jigs solved the squareness problem and provided consistency through all the units built. The time spent designing and building the jigs has paid off over the years. The original jigs are still in use after twenty years. They have been used to build thousands of units (both hive bodies and frames).

Note: The following is a terse version of each of the devices. A complete step-by-step version of the devices is available in the *Bee Culture* references cited in the footnotes.

The Hive Body Jig[1] (Super Jig, see diagram below)

A finish carpenter told me that you had to build a "Story Stick" if you wanted to repeat operations with exactness. Hence the Super Jig came into existence.

This jig holds the sides and ends of a hive body to correct alignment while you screw, nail or staple them together.

In making any jig a few concepts are important.

- All fixed positioning alignment plates must be in an exact position (Square)
- They must not move (Ever-*Ever-Ever*)
- It must be easy to insert parts or pieces and get them aligned

With the following **Super Jig**, a hive body can be assembled in ten minutes or less. When complete, the hive body will be compatible with the rest of your equipment.

Note: The hardwood wedge (J) is used to force the side near the brace (F) tight against the ends.

The **Super Jig** can be used to assemble:

1. Large, medium and small hive bodies
2. Nuc boxes
3. Screened bottom boards

The Frame Jig[2]

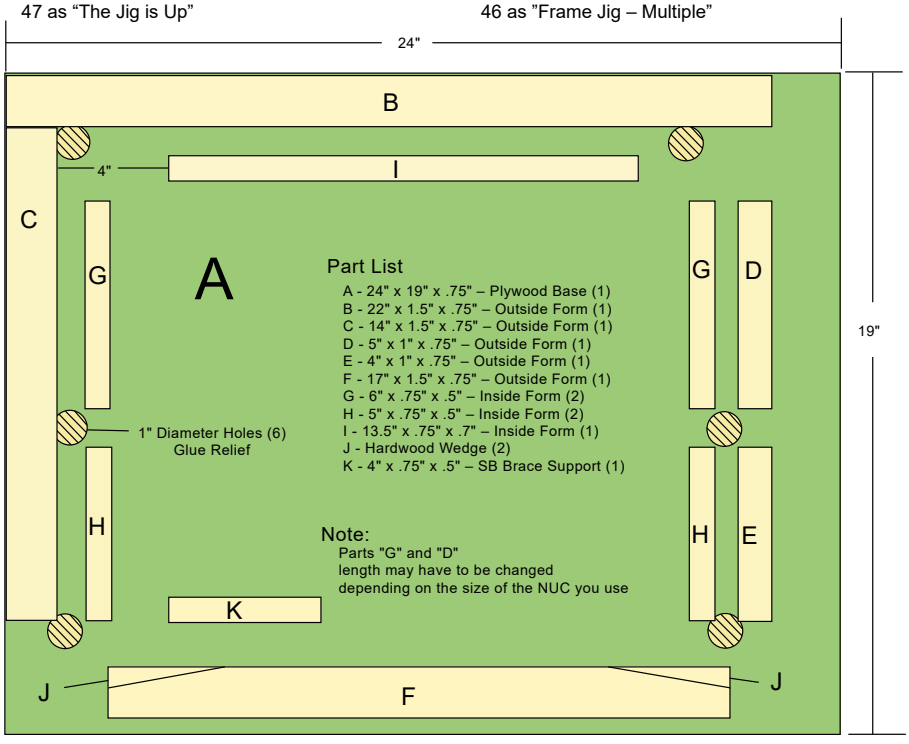
Sometimes you just need to build a large volume of frames. This jig will allow you to build 10 frames at one time.

Parts

1. ¾" x 4½" x 12¾" – End plate (2)
2. ¾" x 4½" x 15⅜"– Side plate (2)
3. ¾" x 4½" x 7" – Hinge plate (2)
4. ¾" x 4½" x 15" – Pressure plate (2)
5. 2" x ¼" – Carriage bolts (6)
6. Washers (6)
7. Hinges (2)
8. Tension spring – Stretch to 20" (1)

Once you get the rhythm of it, creating frames goes fast. If needed, the jig can also be lengthened to easily accommodate more frames.

Usage: The frames ends are placed alternately top/bottom and held in place by the pressure places. After adding glue, the top and bottom bars are stapled or nailed to the



[1]Originally published in *Bee Culture* Sept. 2008 p. 47 as "The Jig is Up"

[2]Originally published in *Bee Culture* Jan. 2013 p. 46 as "Frame Jig – Multiple"

ends. The unit is then turned over and the assembly is repeated. When complete, the pressure plates are released and the frames slide off the inner box. Then additional fasteners can be added as needed.

Caution: Allow the frames to completely dry before attempting to insert the foundation.

The Gargoyle[3]

When I ask beekeepers, "What are the most common problems when working with colonies of bees?" the most common answers were:

1) Unable to find the queen
2) Propolis sticking to everything
3) Hive bodies rotting out (usually at the corners)
4) Stings hurt

I was unable to do anything about problems one, two and four, but I thought I might be able to help with the hive body rotting problem. After watching a couple of the more experienced beekeepers examine hives, it became apparent that problem number two – propolis – was also related to problem number three – wood rot. Being unable to get the hive bodies separated, a hive tool was usually inserted at a corner and forced between the hive bodies. Sometimes this worked, but many times it required more force and the wood on the corner was torn, gauged or chipped. Since the hive bodies were usually reassembled in the same order in which they were removed, the propolis would build up and it required additional effort each time the hive was opened.

It was obvious. The combination of damaging the corner wood with a hive tool and the subsequent rainwater remaining in the corner accelerated the rotting of the wood.

The solution was an established architectural invention called a **gargoyle**. The Wikipedia definition of an architectural gargoyle is:

A gargoyle is a carved stone grotesque, usually made of granite, with a spout designed to convey water from a roof and away from the side of buildings thereby preventing rainwater from running down masonry walls and eroding the mortar between.

Therefore, let me introduce the **Hive Body Gargoyle**. It is a very simplified version of a granite gargoyle and is guaranteed to be free (just a little labor). Additionally, it will not scare young children when they see it.

It is the triangular shaped notch that is removed from the top corners of a hive body. It is very simply made with a belt sander. Four corners can be formed in less than five seconds when you are building or reconditioning a hive body. This little notch provides two very important functions:

1) You can now get an initial purchase for your hive tool without chewing up the corner
2) When water runs down the corner of a hive, it is less likely to remain in the corner because of the slope and the width of the cut

The Swarm Trap[4]

You have just caught a swarm using a five gallon pail. Now it seems as though there are more bees sitting on the lid of the pail than inside it. How can you get them in the pail without possibly releasing the queen and the bees already in the bucket?

An easy solution is a pail lid that employs a funnel or cone to trap the

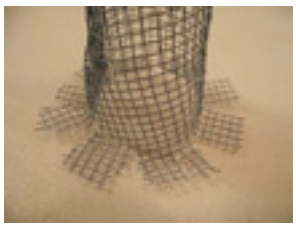
bees. The funnel acts as a one way opening. It makes use of the bee's inability to recognize a small opening that is not on a flat surface as an exit. The same concept (cone entrances) is used in many bee related devices such as pollen traps and escape boards.

Parts

1. Plastic bucket with a lid – 5-gallon size works great
2. 8 mesh hardware cloth – ⅛" holes
3. Epoxy or pop rivets and silicone sealant

Suggestion: Remove the lid seal and cut the locking tabs in half. This makes the placement and removal of the lid easier. You don't need to struggle with the lid when you are trying to capture a swarm.

Caution: Cover the cut screen ends with silicone seal. This prevents many nasty words.



[3]Originally published in *Bee Culture* Jan. 2013 p. 48 as "Gargoyles are Useful and Free."

[4]Originally published *Bee Culture* Dec. 2015 p. 75 as "Build a Swarm Trap."

Extractor Motor Control[5]

Anyone who has built their own motorized extractor and used a variable speed drill as the motor, will understand the problem of controlling the speed (rpm) of the extractor.

Last Fall, a friend and I were watching some beekeepers use their homemade extractor to process honey from one hundred twenty-two frames. The extractor worked extremely well, but an operator needed to hold the variable speed drill they were using to power the extractor at a constant speed. Even with rest breaks and switching operators, keeping the speed of the drill consistent was extremely difficult and unbelievably tiring.

Two weeks later we decided to solve their problem and relieve the operator of this tiring task by re-motorizing the extractor. Before we could tackle motorizing the extractor, we needed to develop a device for the variable speed drill that would allow the operator to set and hold a constant speed. The Mechanical Speed Controller is the result of this decision.

Problem

The variable speed trigger on the drill worked great except the trigger could only be locked at the maximum speed. This was unacceptable; it would tear the frames apart at high speed. What was needed was a way to use the available drill trigger to start at zero RPM (revolutions per minute) and slowly increase the speed until the desired RPM was achieved. Then the device needs to keep the RPM consistent at this operator selected speed.

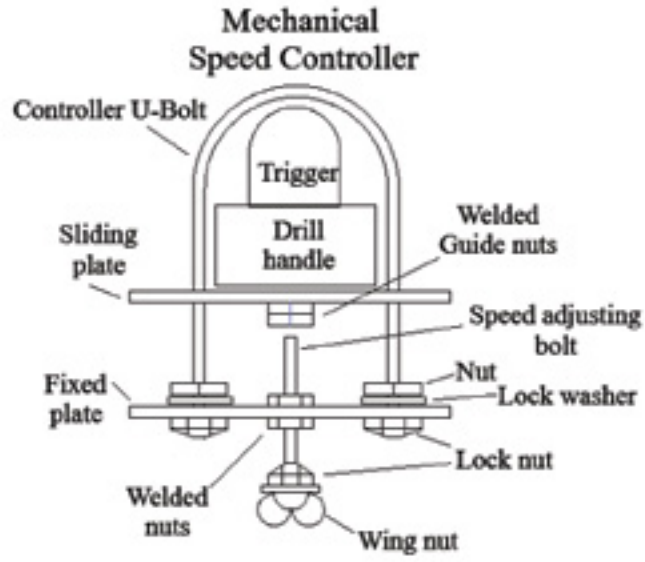
Note: The parts sizes listed are for the controller described in this article. You may need to adjust these sizes to accommodate your drill.

[5]Originally published *Bee Culture* Dec. 2022 p. 78 as "Build a Mechanical Speed Controller."

Note: The drill used for this article and the subsequent extractor motorization is a ½" – zero to 600 RPM variable speed drill.

Parts – Speed Controller

1) 1¾" x 4" – Controller U-bolt (1)
2) Sliding plate – U-bolt plate (1)
3) Welded guide nut (2) (larger thread diameter than the adjusting bolt)
4) Fixed plate – U-bolt plate (1)
5) Fixed plate welded nut (2) – Same size as the speed adjusting bolt
6) Fixed plate nut (2)
7) Fixed plate lock washer (2)
8) Fixed plate nylon lock nut
9) ¼" x 3" – Speed adjusting bolt (1)
10) Speed adjusting bolt nylon lock nut (1)
11) Wing nut (11) BC



Note: The nuts welded to the sliding plate are not attached to the adjusting bolt. They are used to keep the adjusting bolt point in position on the sliding plate.

Submitted by Abrea Stout

Submitted by Joe Fusilier

Submitted by Abrea Stout

Submitted by Joe Fusilier

Image Gallery

Honey Hauls

Mayans Millenary Beekeeping Tradition and their Regal Lady Bee

Diego Ramírez Martín del Campo

Many cultures throughout history have established a tightly knitted relationship with beehives and the commerce of their products. Although Egyptians were the first society to leave extensive records of honey bee rearing, archaeologists suspect that we may have been practicing beekeeping since the Paleolithic era, over six thousand years ago.

Egyptians used honey and wax for ceremonies, food, trades and burials. Later, the Greeks found in bees the perfect object of admiration and contemplation. Virgil thought that these insects were an example of divine creation. For Aristotle, they were a reflection of society itself. The Romans thought that honey had divine status and that some gods were connected to bees.

As a source of food, income and religious worship, bees have played a central role in the development of different civilizations throughout the ages; nonetheless, few societies have had such a deep and intimate relationship with their beehives as the Mayans did.

The year 2000 BC was when central Mesoamerica saw the dawn of the Mayan Civilization with the establishment of their first settlements in what today is Tabasco, Mexico. For over 3,500 years, until the fall of their last city in 1697 AD, Mayas extended and controlled today's south of Mexico, all of Guatemala and part of El Salvador, Honduras and Belice.

Their interest in apiculture products was such that, upon the arrival of the Spanish conquistadors, 94% of the Mayan cities paid tribute to the Spaniards in the form of wax and honey. According to ancient records, some 29 tons or 65 thousand pounds of wax and 3.3 tons or seven thousand pounds of honey were collected.

According to Mesoamerican studies researcher, Genoveva Ocampo, for the Mayas, honey was considered "a food of the Sun, creator and regenerator, mysteriously elaborated in the stomach of melipona bees."

In the manuscript, *Ritual of the Bacabs*, we find at least one honey-based medical prescription as treatment for each illness listed in the book. Honey was said to restore the *hun ol* or "the well-being of the hearts." Among these remedies, we find honey as a treatment for respiratory, digestive, circulatory and immune system disorders, and to soothe fevers and poisonous bites. It was also used to alleviate hunger and clear the mind of people in sickness.

The wonder worker responsible for the sacred honey is the *Melipona beechi*. Colloquially known in southern Mexico as the "sacred Mayan bee," it is known as *xunan kab* in the Mayan language, meaning "regal lady bee." *Meliponas* are a stingless group of bees of golden color with black stripes, smaller than their European counterparts but packed with a ferocious bite. Their honey production is considerably lower than that of Europeans' hives, producing only a liter of honey a year, in contrast to the 30 liters European ones can produce.

Unfortunately, many of the traditions that linked beekeeping and the Mayan culture are now lost. Due to the intrinsic relationship bees and religion had to their culture, a great number of their practices were forbidden during the Spanish inquisition. Not only were they prohibited, but many of their records and books were burned.

What was saved through manuscripts, books, the work of archaeologists and oral lore, tells the story of a pantheon deeply associated with bees. *Caab* was the Mayan word for both the world and honey. So, their *caab* and the netherworld were held by a giant ceiba, and connected them with the sky. The latter was held in place by gods called *bacabs*, represented with bee-like features and associated with the cardinal points. Each point was also connected with a particular colored bee and a special type of flower.

To keep the gods satisfied and to ask for the protection of beehives and their flowers, ceremonies and feasts were held during the fourth, fifth and ninth months of the Mayan calendar. These ceremonies were also celebrated to ask gods for rain, good harvests and health for the owner of the milpas and the whole community. The gods were *Ah Mucen Caab*, *Noh Yum-Caab*, *Balam-Caab* and *Moc-Chí*. The latter three were bee-shaped deities that used bees to help other gods and keep their people in check. Among them, *Ah Mucen Caab* was the most relevant. Also known as the descendant bee, he was their god and protector of honey and its collection, and according to some archaeologists, he was related to the creation of the world. He gave bees to humanity for their care, and as so, bees represented a piece of a deity, producers of wax, of nutritious food and worthy of worship.

To properly take care of their bees, the Maya built artificial hives in hollow logs with easily removable lids made of clay. They would then place them under a palm roof or palapa to protect them from sun and rain. Hives would always face east so that bees would receive the first rays of sunlight at dawn and "wake up early to work." This is a tradition that is still practiced in southern Mexico.

Even though some of what made the Maya an intrinsically apicultural society is known to us, many of their traditions and practices were lost in time or are still waiting to be discovered. However, the profound impact that melipona bees, the *xunan kab*, had in their culture and modern Mexican beekeeping is undisputed.

"Melipona beecheii" *by gailhampshire is licensed under CC BY 2.0*

Today, *Melipona beecheii* is an endangered species, and many of the practices that once supported it are now endangered too. Climate change, the destruction of its habitat, the excessive use of pesticides, infections and their displacement by European and African bees are causing irreversible damage to this once deity among bees.

However, growing global awareness of climate issues and the increasing level of recognition of the role of pollinators has prompted local organizations and associations to take steps towards a better understanding and protection of bees.

Mexico has some 1,900 bee species, 46 of which are meliponas, all of which are endangered.

In 2021, the Federal Beekeeping Law was passed, which recognizes the bee as a priority protection species. In addition, public policy initiatives such as the National Strategy for the Conservation and Sustainable Use of Pollinators, which will regulate the extraction, entry, purchase and sell of pollinators in Mexico came into operation.

More recently, a government-founded national forum entitled "Honey bees and beekeeping" was held last May 18 to educate beekeepers in new and beneficial practices and to educate laymen in the appreciation and value of bees, particularly melipona bees. This forum will continue to be held annually during World Bee Day.

Public action has been one of the most impactful factors in the defense of the melipona bee. Civic associations and NGOs have taken on the task of educating the public and protecting bees more directly. Some of them, like the *Iniciativa para la Naturaleza* or *INANA*, have developed localized networks of melipona beekeepers and promoted the construction of meliponariums throughout the country. These structures, based on traditional Mayan hives but modernized with modern knowledge, have gained popularity as sanctuaries for melipona bees in urban and rural regions.

Within cities, associations like *La abeja del barrio* promote "apitourism" to teach ordinary people the basics of apiculture and develop new beekeepers. *Abeja Negra SOS* helps relocate swarms and hives inside of cities to safer areas and to help develop their new homes.

All of these organizations, among many others, exist on a not-for-profit basis and rely on the support of monetary donations and the sale of honey-based products. They, as the Mayas once did, assume the mantle of the modern protectors of the regal lady bee. BC

MOISTURE CONTENT BLENDING

Greg Carey

Not every problem in the beeyard requires hammers and saws to solve. Occasionally, you will have a bucket of honey that has a moisture content well above the 18.6% gold standard. You have a few choices. You can feed it back to your bees if you are sure it is disease free. You can find a mead hobbyist or become one. Or you can blend the high moisture content honey with honey of a lower moisture content. Since my capped harvest traditionally comes in at ~17% or below, I have chosen to blend any high moisture content honey with the honey that I have on hand.

The first time this happened I created a simple Excel spreadsheet to take the guess work out of how much of each to blend and get a final blend with the moisture content that I want.

The sheet is easier to put together than it is to explain, but I will use the table to hopefully explain how this works. Row 1 and Column A are labels and entered just as read. Cells B2, B3, D2, and D3 are entered fresh each time and come from the honey as measured by the beekeeper. The Totals found in Row 4 are the simple sums of the two cells above them, i.e., =SUM(B2:B3). The formulas for the % of mix found in cells C2 and C3 are =B2/B4 and =B3/B4 respectively. The final formulas for cells E2 and E3 are =C2*D2 and =C3*D3 respectively.

I included the notes in the box below to help explain each cells content/purpose. Go ahead and play with changing the beekeeper input variables until you are satisfied it works. You may not need this now but set it up and save the file. Just like that hammer in your toolbox, it will be there when you need it. Beekeeping. It's more than bugs in a box.

[a]Enter the weight of the dry honey.
[b]Enter the weight of the wet honey.
[c]=SUM(B2:B3)
All Totals are simple sum formula.
[d]=B2/B4
% of mix formula.
[e]Enter the moisture content of the dry honey.
[f]Enter the moisture content of the wet honey.
[g]=C2*D2
Total Moisture formula
[h]This will be the moisture content of the blend.

	A	B	C	D	E
1	Honey	Total Lbs	% of mix	% moisture	Total moisture
2	Dry[a]	45	69.23%[d]	17.00%[e]	11.77%[g]
3	Wet[b]	20	30.77%	22.00%[f]	6.77%
4	Totals[c]	65	100.00%		18.54%[h]

THE HONEY BEE'S WINTER NEST

Necessary for Surviving the Big Dearth

But first, these thoughts

Over time, beekeepers change their ways, but bees always stay the same. During the past few years some novel issues, that are new to beekeepers, have been suggested and discussed in the media. Whether or not bees sleep has been addressed and then re-addressed. Apparently, they do. If bees feel pain or have other sentient qualities have been topics of other discussions. These unclear bee qualities are still being explored. Even honey is in the bright light of the popular media. Some postulate that bees are not the only animal able to make a honey-like product. Somewhat like lab-grown protein, a sweet product, having chemistry akin to that of honey, has been blended with nary a bee in sight. Is it honey or not? Topics like this help keep beekeeping interesting and keep bee knowledge evolving.

These are not the bees' problems

All these current discussion topics are beekeeper related. While we humans gnash and pontificate, the bees plod along in their own world doing their own thing. Their biology is consistently their business and honey bees seemingly worry not one whit about their human counterparts. It appears that the beekeeper/bee relationship is totally one-sided one.

Figure 1. The moment of interaction between two distinct species – humans and bees.

Bees' complex and mysterious biology

Though topics abound, it seems to me that our most recent significant advances in understanding our bees has been in the areas of bee biology and related pathogenic subjects. While we know much more about our bees today, we still are far from understanding everything.

Preparing for foodless times

In a real way, much of what bees do in the Springtime is in preparation for the next Winter season. To survive Winter's coldness, bees must find a suitable nest site and construct combs, which are their only nest furnishings. They must gather food and store it. They must maintain a queen presence, maintain worker populations and swarm to procreate their species. They must defend their nest from interlopers and even defend against their own marauding bee neighbors. Without a protected nest site and suitable stocks of food, a honey bee nest will surely die in the Winter season. Bees clearly understand this harsh fact. Their base of operations – the nest – is critical to withstanding the Winter season.

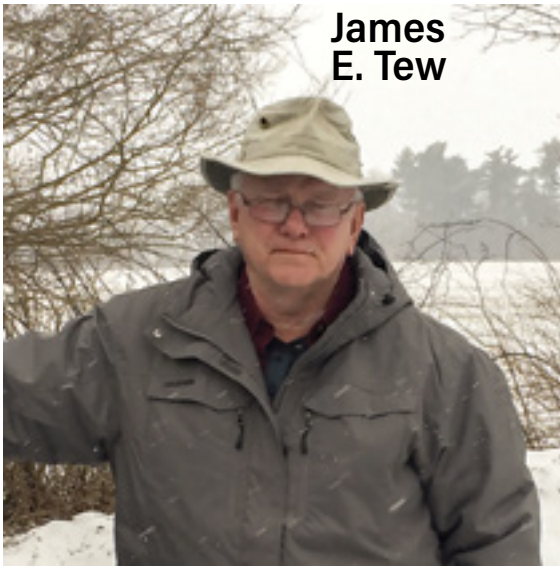
Figure 2. What a honey bee nest looks like without beekeeper involvement. Note the propolis band around the combs.

Listen along here!

The natural nest – an absolute necessity

When searching for a home, bee scouts usually look for a surprisingly small cavity – maybe as small as one cubic foot (.023 cubic meter). Finer features of a future home are that it should: be dark, have a defendable entrance, be dry and not have anything else living there such as birds, squirrels or ants. Ideally, it should not be on or at ground level.

When tearing into trees, early beekeepers were confronted with a morass of bees, comb, brood and dripping honey. How could any rational organization be seen in such chaos? As we now partially understand, the bee nest is a highly structured living environment. Understanding that fundamental structure – so much as is currently possible – can help make all of us better beekeepers.



The size of the nest

Feral nest sizes seem to vary significantly. How quickly, if ever, a colony can fill a cavity varies greatly; therefore, some nests are large while others stay relatively small. Reasons for size variations could be genetics, diseases, pests and water. The availability of nectar and pollen resources is critical. Simple, blind luck is also a helpful characteristic to a feral colony.

In fact, as humans have altered the general environment, suitable nesting sites have become much dearer to scouting bees forcing them to accept sites not perfect for their needs. Occasionally, a swarm is forced to build in the open, a fatal decision for most nests within the temperate parts of the U.S.

The nest fixtures

The natural bee nest is plainly furnished with wax combs only. Though bees can diligently modify the nest cavity to a degree, for the most part they must accept the space as it is. Along the top and sides of the nest, surveyor bees will lay out the beginning midrib of combs and other bees will begin to construct comb along those lines. We don't know how these bees measure the spacing needed when establishing dimensions for future comb. Keenly observant beekeepers long ago discovered that bees require a specific living and working space – or the famous *bee space* concept. That understanding allowed the subsequent development of artificial domiciles that we have used for more than one-hundred years.

When bees first occupy a new nest cavity, the first matter of business is to construct worker combs. Besides being an area to nurse developing worker bees, worker-sized comb can also be used to store nectar, pollen and occasionally water.

Comb construction

To us, new combs seem to be produced almost mystically. The bees will mass together into a group that we have called a cluster. The cluster is not a rigid structure but is fragile and temporary. As bees hang together in such a cluster, gravitational forces will cause it to hang perpendicular with that influence. In essence, combs are built at right angles with gravity's pull. Later, within the dark hive, this gravitational orientation becomes important in the dance language communication procedure.

Four pairs of wax glands on the ventral surface of the bees' abdomen produce snow white wax flakes. Comb constructing bees pass a newly produced wax flake forward to their mouths where the wax is chewed and pulverized. After a short time, the wax particle is molded, using the bees' trowel-shaped mandibles, into a cylindrical developing cell. It's a communal effort. Other bees may reshape previous efforts before adding their own contribution of wax to the new cell, but finally a new cell is produced. No single bee actually constructs a single cell.

Experienced beekeepers have seen the completed cells in use near the top of a new frame while lower on the comb, shallower cells will still be under construction. Bees build comb as needed. New wax melts down to canary yellow and is valuable for candles and other wax-produced products. It's a beautiful product.

The importance of a nectar flow

Inexperienced beekeepers are frequently disappointed that all brood chamber space and super space is not used by the bees during a particular season. Indeed, beekeeper-supplied foundation may even be chewed and mangled by bees, and not building comb on it (though it will probably be successfully used during subsequent seasons).

Bees will only construct comb on the impetus of a nectar flow and a comb space shortage. Simply stated, bees must have construction material (nectar) before they can build. Nectar provides that building material, but an unusual building material it is for it can also be stored as honey rather than restructured into wax. Bees will not use stored honey to construct significant amounts of new comb. The experienced beekeeper will provide previously drawn comb for the bees to store the honey crop rather than requiring bees to rebuild comb each year.

Comb is costly for the bees to build. It has been found that bees must metabolize about seven to eight pounds of honey to produce one pound of wax. But with that one pound of building material, bees can build 35,000 cells in which they can store 22 pounds of honey. Consequently, their approximate net gain after consuming eight pounds of honey is 14 pounds of stored honey plus reusable comb.

It takes about 10,000 bees, over a three-day period to produce one pound of wax. That one pound will be made up of about 500,000 scales. Comb construction for the bee hive is clearly an investment. Inexplicably, cappings and other wax particles are not reused to any degree but are allowed to drop to the bottom board where they either accumulate or are discarded in front of the colony. New wax is soft and pliable and will break easily, but as the comb ages, it becomes reinforced with cocoons and propolis. Whereas new comb is snow white, old comb is nearly jet black.

Figure 3. New and old comb comparison.

Types of comb cells within the beehive

Worker comb is, by far, the most abundant comb size within the colony. As mentioned previously, worker sized comb (about five cells per inch) can be used by bees to house developing worker bees or to store honey and pollen. Larger cells, about four per inch, are used to produce drone larvae or to store honey and pollen.

Distorted cells or cells of intermediate size can occur that are used by bees to splice comb cells together. In other words, worker comb will be filled with patches of drone comb with small amounts of *transitional* comb wherever needed in order to make a piece of solid comb. Some cells may either be drastically modified or built

purposefully for raising queens. As you would expect, this type of comb cell, though distinctive is not very common within the combs. A precursor to queen cells are queen cups which are simply queen cells that are not in use. Worker cells, drone cells, queen cells and transitional make up the types of comb cells within the colony.

Brace comb, burr comb or ladder comb

Bees will frequently build brace comb between frames, above or below frames, or on the bottom board – especially after a colony has been recently moved. Anywhere bee space is violated, additional comb may be built that is a nuisance to beekeepers in commercially manufactured hives. Normally, in managed hives, it is scraped off and melted as high-quality wax. Within wild nests, it remains in place and helps give rigidity to the overall nest.

Figure 4. Common burr combs on top of frames. This is a common sight for beekeepers. Note bee space separating frames.

Bee space

The concept of *bee space* has been mentioned several times. Within both wild and managed hives, bee spacing must be respected. Bee space is generally considered to be anything between ¼" and ⅜". Space less than ¼" will be filled with propolis while anything greater than ⅜" will have either comb or brace comb built within the space depending on its size. In our beekeeping literature, the Reverend L.L. Langstroth is generally given credit for conceptualizing the notion of bee space.

Propolis – the colony's caulking compound

Propolis is little known outside of the inner circles of beekeeping. Produced from resinous materials collected from the buds of trees or from resins from softwoods, propolis is used to caulk the hive tight. Though stringy and sticky when fresh, propolis dries hard and brittle. It is soluble in alcohol and has a pleasant weedy odor.

Since there is no real difference between the two, both wild and managed bees produce propolis. Caucasian bees are renowned for collecting copious amounts of propolis and will occasionally nearly close an entire colony entrance if left to their own schemes.

Propolis is the material that causes the hive to crack sharply when opened. Propolis was the primary demon that relegated so many hive designs to beekeeping's junk heap. If colonies are not opened for several years, propolis will make the hive very nearly impenetrable. Propolis, along with pollen, darken white wax over a period of just a few years. Additionally, in addition to being used to polish cells, propolis is added to the wax that covers cappings; therefore, giving them a different appearance than honey cappings.

Propolis is bacterially active and will restrict bacterial growth. Probably due to this antimicrobial characteristic, propolis is used to entomb anything the bees can't move – such as a dead mouse or a small tree twig.

There it is – the dark nest

Inside this dark maze of twisted, bee-spaced combs the bees live in hot, humid darkness during warm months and cold darkness during Winter months. Through the beekeeping years, innovative beekeepers have learned how to take the bees' penchant for building natural comb and have enticed them to build comb within wooden frames – mainly for our human convenience. It's too difficult to remove cross-combed frames for honey removal, disease inspection or colony manipulations.

Inside the warm, dark nest

Inside the warm, dark nest, bees probably communicate by pheromone perception (crudely described as a type of odor), touch and other sensory perceptions such as gravitational sensitivity and electro-magnetism.

The nest is incredibly crowded. Bees are literally shoulder to shoulder. Yet, all these characteristics vanish when the beekeeper removes the outer cover from the hive. All becomes visible and the normal way of the colony, with the application of smoke to mask the effective communicative odors, is disrupted.

Within the undisturbed dark hive, everything has a unique odor: workers, the queen, drones, nectar, wax moths, brood, pollen, the hunger of larvae, danger, whether larvae are in the correct cell – everything seems to have an odor cue (or some other kind of indicator) within the dark hive. As beekeepers, we crudely use smoke to mask this elegant chemical communication.

Temperature must be regulated to about 95°F in the brood nest, nectar must be enzymatically reduced and excess water removed to form honey, brood must be fed freshly collected pollen and this hive-city must be defended from intruders and pests.

This society must be kept in balance. In a full-strength colony, there are about 60,000 reproductively sterile workers, one fertile queen and about 400-600 drones. Developing brood must be produced in anticipation of upcoming nectar flows or Winter seasons. All these individuals come together to form the super-organism – the bee nest. Even under ideal conditions, individual bees are incapable of supporting themselves for more than a few weeks. The total bee nest is the animal – not the individual bee. Such is life in the bee's nest – so much as we can understand. BC

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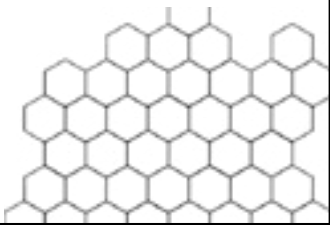

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Honeyed Cornbread

from the National Honey Board Website (https://honey.com/recipe/honeyed-cornbread)

Ingredients

□ 2½ cups self-rising cornmeal
□ ½ tsp salt
□ ¼ cup vegetable oil
□ ½ cup creamed corn
□ 1⅓ cup buttermilk
□ ¼ cup honey
□ 1 egg
□ 1 tbsp vegetable oil (for skillet)
□ Honey and Butter for serving

Directions

Step 1
Preheat oven to 450°F.

Zankopedia, CC BY-SA 3.0, via Wikimedia Commons

Step 2
Swirl the 1 tbsp vegetable oil in a cast iron skillet. Place in the over to heat. *Watch that it doesn't start to smoke!*

Step 3
Mix the cornmeal and salt in a large bowl.

Step 4
In a second bowl, combine the vegetable oil, creamed corn, buttermilk, honey and egg.

Step 5
Stir the wet ingredients with the dry until just combined. Batter will be lumpy, *don't over mix!*

Step 6
Open the oven and drop a tsp of batter into the hot skillet to make sure it is heated enough to sizzle.

Step 7
Once heated enough, carefully pour the batter into the skillet.

Step 8
Bake for 20-25 minutes until set and golden brown.

Step 9
Cut into slices and serve with additional honey and butter.

Tip
Add 4 pieces of chopped bacon to the batter for a special treat!

CALENDAR

♦FLORIDA♦

The Palm Beach County Beekeepers Association presents the **South Florida Honey Bee Expo 2024** from Friday, February 16 through Saturday, February 17, 2024. The expo will be held at the Palm Beach Gardens campus of Palm Beach State College located at 3160 PGA Boulevard, Palm Beach Gardens, FL 33410.

Presenters include Ellen Topitzhofer (Cornell University), Petra Ahnert (author of *Beehive Alchemy*), Nathan Reid (Dalan Animal Health), Chris Werner (Indian Summer Honey Farm) Dr. Garett Slater (USDA-ARS Bee Lab in Baton Rouge), Branden Stanford (Florida Department of Agriculture and Consumer Services), Angie Thul (Florida Department of Agriculture and Consumer Services), Jennifer Hagen (University of Florida/IFAS Extension Lee County) and more!

The Expo will feature two full days of lectures and workshops. There will also be a Welsh honey and mead judging competition and a bee supply marketplace. An on-site apiary with live demonstrations will be available throughout the event.

For registration and additional information, see the Expo website: **www.honeybeeexpo.org**

♦ILLINOIS♦

Illinois State Beekeepers 134st Annual Fall Meeting will be held at the Northfield Conference Center in Springfield, Illinois on Saturday November 4, 2023 from 8am to 5pm.

Speakers will be Dr. Samuel Ramsey, Mel Disselkoen and Dr. Alexandria Payne. The meeting will feature a meet and greet on Friday night (November 3) and many vendors.

A group hotel room rate of $89 per night is available at Northfield Inn and Conference Center – just mention ISBA rate.

The cost is $60 for ISBA members and their immediate family, $50 for ISBA members who are veterans/active military and their immediate family and $75 for non-members. Tickets purchased before October 29, 2023 includes a buffet lunch.

To register, go to: **https://www.ilsba.com/**

♦KENTUCKY♦

The **Louisville Beekeeping and Research Conference** by Apis Rescue is targeted to the last Saturday of January (1/27/24) from 9am-6:20pm EST. It will be held at University of Louisville Conference Center (old U of L Shelby campus) – 450 N Whittington Pkwy, Louisville, KY 40222.

The theme for this *in-person* conference is "In Pursuit of Survivability."

The conference provides an exceptional and affordable regional opportunity to see some of the finest beekeeping content provided in Intermediate, Advanced and Research tracts. Lunch and parking are included. There will be vendors and end-of-day door prices.

Speakers include: Dr. Clarence Collison, Dr. Farida Olden and Dr. Thomas Webster as well as EAS Master Beekeepers Kent Williams, John Benham, Leonard Davis DVM and Jake Barker.

Registration of $65 is *Required.*

Learn more and register at **https://www.apisrescue.org/events**

♦NEW YORK♦

Southern Adirondack Beekeepers Association (SABA) Spring Seminar will be held on Saturday, March 23, 2024 from 8am-4:30pm at Hudson Valley Community College TEC-SMART in Malta, NY 12020.

The seminar will includes guest speakers, a raffle, vendors, door prizes and more!

For more information and updates, see: **https://sababees.org/**

Western New York Honey Producers, Inc. (WNYHPI) presents Ross Conrad, *Keeping Bees Healthy: Naturally.* This event will take place on Saturday, November 18, 2023 at the Aurora Theater 673 Main Street, East Aurora, NY 14052 from 3pm-6pm. Arrival for the event will happen between 2pm-3pm.

This event is open to the public. For WNYPHI members, the cost is $10 and non-members, $20. Refreshments will be available for purchase.

For more information on WNYHPI, go to: **https://wnyhpi.org/calendar/**

♦PENNSYLVANIA♦

Western PA Beekeeping Seminar will be held on February 9-10, 2024 at Gateway High School (3000 Gateway Campus Blvd. Monroeville, PA 15146).

Early bird tickets go on sale in September 2023.

For more information, please visit **https://www.beavervalleybees.net/yearly-happening-wpa-sem**

♦SOUTH DAKOTA♦

The Black Hills Area Beekeeper's Club will be hosting the annual Buzz in the Black Hills Conference on Saturday, February 24th, 2024 from 8am-4pm in Rapid City, SD.

Go to **https://www.eventbrite.com/e/copy-of-buzz-in-the-black-hills-conference-tickets-673898758327?aff=ebdsoporgprofile** for more information.

♦TEXAS♦

The Texas Beekeepers Association Annual Convention for 2023 will be held at the Mayborn Convention Center in Temple, Texas. The event will take place on November 2-4, 2023.

Thursday will have two workshops – a full day with Dr. Zachary Lamas titled "What is Vector Biology and How Does it Run the World?" and a half day workshop with Dr. Juliana Rangel-Posada titled "Queen Rearing".

Friday and Saturday will have education presentations and the annual business meeting and election of officers.

Watch the TBA website for registration details: **https://texasbeekeepers.org/**

♦ABF♦

The 2024 ABF Conference and Tradeshow will officially begin on Wednesday, January 10th; however, there are some scheduled special tours on Monday and a "Dinner and a Show on Tuesday.

The Vendor Expo is now sold out with over 50 vendors. Make sure to stop by and shop. Check the website for the list of vendors. If you have any special orders, contact them and they will bring it with them for on-site pickup.

Education: Back to a three track schedule. Each level will have a schedule with topics targeted for them.

Fun: From opening ceremonies to the Saturday tour to the Baton Rouge Bee lab, this will be a fun filled event. This year's offsite event will be at the House of Blues.

New: A forklift certification is being added this year on Friday with the program being held in both English and Spanish. The first part will be an online test with the attendees needing to cover the cost of the test. The new American Honey Queen and Princess will be crowned.

A special honey judging class has been lined up. It will include teaching how to judge honey and creating a set of rules for judging nationally. A three hour workshop will follow by Dr. Judy Wu Smart on "Science Policy and Advocacy Training for Beekeepers". After the lecture, attendees will break into small groups and practice the skills taught in the lecture.

Pre-registration will close on December 26, 2023.

See the website for the complete schedule, hotel information and tours: **https://abfnet.org/2024-abf-conference-frame/**

ABF Registration Pricing	Early		Regular		On-Site	
Registration	Member	Non-Member	Member	Non-Member	Member	Non-Member
Individual Registrants Full Conference	$245.00	$305.00	$295.00	$355.00	$345.00	$405.00
Individual Registrants Day Rate	$150.00	$190.00	$175.00	$215.00	$200.00	$240.00
Student, Educator, ABRC, AIA	$60.00					

* 10% discount for active military and first responders.

CLASSIFIEDS

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Image Contest – Holiday Hives

We've started an image gallery! This month, we want to see any and all pictures you have of your **Holiday Hives**. 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 **Jen@BeeCulture.com**
Use the subject "**Image Gallery**"
Please include in your email:
- The image as an attachment (we will not consider it if it is embedded)
- Your First and Last name
- Your mailing address
- Your renewal code (if you know it)

If your image is chosen:

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

I own some ancient bee equipment. Last Spring, while tearing apart a rotten telescoping hive cover to salvage its tin outer shell, I came across an intriguing bit of hive insulation – the classified section from an April 1934 Denver Post! Naturally everything was cheaper nearly a century ago. I found no ads for beehives for sale, but during the Great Depression, prices for most everything were very reasonable. You could rent a room in a boarding house for $5 a month or an entire five-room house for as little as $7. One ad that caught my eye: Refined girl, 29, owns nice farm, car, will marry. There was a whole section devoted to poultry, with the going price for chicks a little over a nickel.

You might wonder how I came to own a 90-year-old hive cover, and the answer is Paul's junk pile. When I started beekeeping, I rooted around in there a lot.

Gentle reader, your bees care not a whit what condition you bee equipment is in. It doesn't bother them if your brood frames are not lined up straight. Maybe you have time on your hands. I have no idea what that would be like. You can fuss all you want. You can paint little flowers on your supers or put a fancy copper roof over them, but your little darlings will come out miles ahead if you devote your energy to waging war against *Varroa* mites.

It's September as I write. Derrick's honey house is backed up with his honey, as he copes with an electrical overload problem. He extracted my mountain wildflower honey for me – God bless him – but I can't get in the door with my alfalfa honey. So I still have honey supers stacked on some of my hives, and this is crunch time for *Varroa*. As bee populations dwindle in preparation for Winter, *Varroa* numbers continue to rise – a perfect storm for colony collapse. I do a lot of sugar-shake mite testing. I like to know exactly what's going on and not make wrong guesses.

Killing mites in hives with surplus honey limits my options. I can't use treatments that might contaminate the honey. And usually it's the colonies with the most honey supers that harbor the most mites. Think of it this way: a fecund queen lays lots of eggs that produce lots of bees that bring in a bumper honey crop. But lots of eggs means lots of brood, and *Varroa* mate and raise their young inside the capped brood.

I've occasionally resorted to brood removal as an aid to oxalic acid dribble or formic acid treatment of hives with honey supers. This is a dangerous road at a time when long-lived Winter bees are emerging, but life, and especially beekeeping, is a game at which we take calculated risks.

Let's say a colony tests out at 20 mites in a 300-bee sample. The experts will tell you this hive is a goner. But if I scrape off the capped brood and give the bees a highly effective oxalic acid dribble, I've stopped the mites in their tracks. Is it too late to save these bees from viruses spread by the mites? I guess I'll find out.

Sometimes I compromise and remove only some of the capped brood, hoping to reduce my mite birth rate but still allow some Winter bees to emerge.

I'm in the weeds again. Can you tell? I'm making this stuff up as I go, because my back's against the wall. I know how hard it is to control *Varroa* and I know what happens when they get the upper hand. Your best colonies collapse.

In a perfect world, I'd have my honey off by mid-August. Then I'd give the bees a thymol treatment while the weather was nice and warm, before the mites take charge. I said in a perfect world.

Back in June, Paul tipped me off to a two-square-mile block of blooming alfalfa a couple of miles from one of his yards. He said he'd never seen a bloom so purple. When I pulled up to the farmhouse smack dab in the middle of this wondrous sight, I met Harold, who is even older than I am. I don't know how we got started talking about skiing, but he told me he started skiing on Aspen Mountain in 1947. In high school, he and a buddy drove 60 miles up to Aspen on the weekends. They got free lift tickets for unloading groceries off the chairlift for the mountaintop Sundeck restaurant. Harold rhapsodized about Aspen in the good old days. He doesn't much care for the glitzy place it's become.

We reminisced about skiing until finally I ventured that the gal Marilyn was expecting me for supper. Harold told me where I could put some bees.

I was a day late and a dollar short getting 12 hives up there. The little darlings did have a good couple of weeks before all that alfalfa went to seed. If I'd been a month earlier they'd have made a killing. I said "if".

Grandma kept honey bees on the Packard Ranch outside of Whitehall, Montana, long before *Varroa*. Grandma was wise, and she never minced words. She liked to say that "If and When were two poor men."

We live and we learn, and sometimes we lapse and have to re-learn. We don't give up. We pick ourselves up. We're beekeepers. BC

Gentle reader, did you find this poor epistle amusing, heartwarming, instructive? Contact Ed Colby at **Coloradobees1@gmail.com**. *Ask him to promptly mail you an autographed copy of* A Beekeeper's Life, Tales from the Bottom Board *– a collection of the best of his* Bee Culture *columns. Price: $25. Satisfaction guaranteed or your money back!*

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