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AUG 2022

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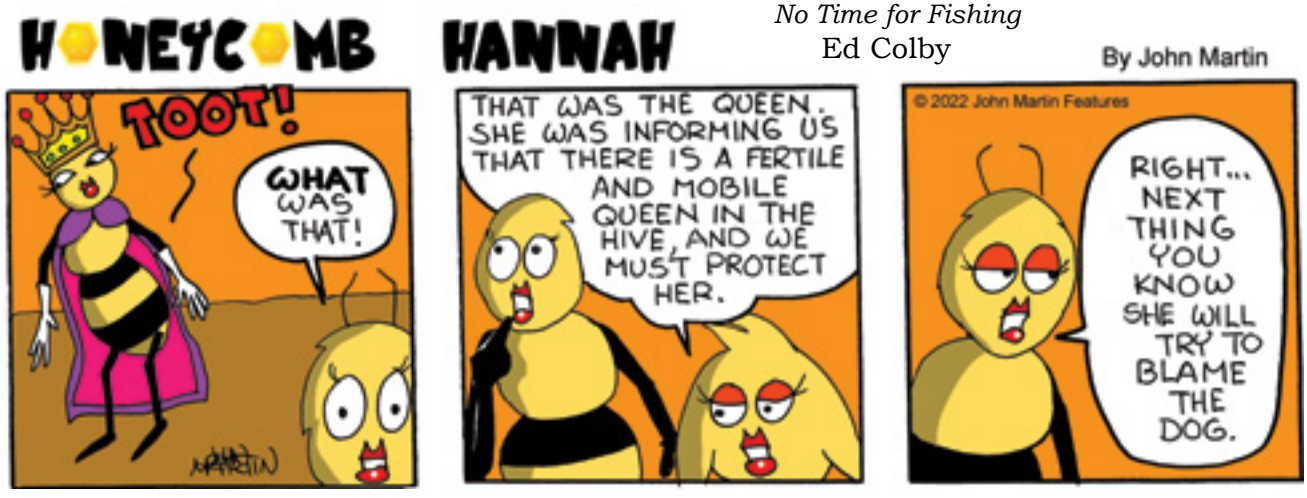

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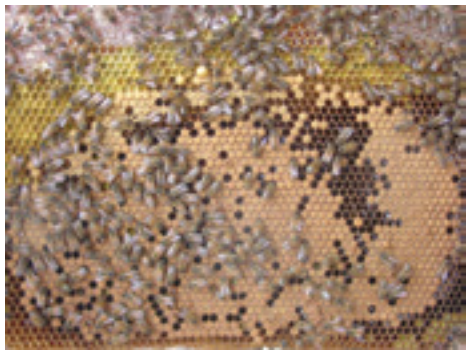

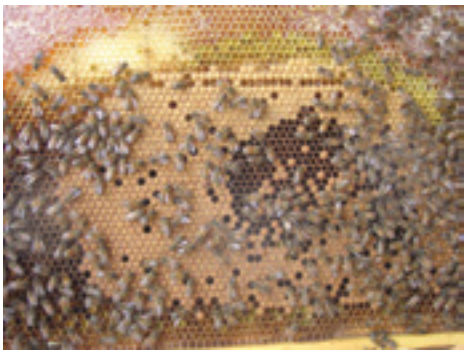

Some pictures to show it can be done!

I saw your article regarding using Brother Adam's Modified Dadant hives and thought I would contribute a few notes. This thread on *Bee Source* will shed a lot more light on the topic. **https://www.beesource.com/threads/hive-designs-and-their-advantages-and-disadvantages.327565/**

Europe commonly uses the Dadant Blatt hive which is 11 frames i.e., a rectangular box. Brother Adam settled on the Modified Square Dadant hive which holds 12 standard frames. The original Dadant hive was about two inches longer. The hive was shortened so Langstroth length frames would fit in it and called the Modified Dadant. This made conversion from Langstroth to Dadant depth easy. There was also the Jumbo hive which was a Langstroth dimensioned box made deeper to accommodate Dadant depth frames. You can read about this in C.P. Dadant's book. **https://books.google.com/books?id=4-8sAAAAYAAJ**

I swapped over entirely to Square Dadant hives in 2016 and have used them for the last five going on six years. I had them made out of cypress by an Amish guy in Tennessee. My all-in cost for a box with cover, bottom, frames and foundation was $75.62 each. This does not include the queen excluders which cost $25 each with shipping from Europe (purchased from Swienty). It also does not include the cost of nails, glue and paint. I made my own frames because I am a lot pickier and want them to fit right. I sourced wax foundation in 5.1mm from Dadant and have about 150 pounds in storage ready to use. It was NOT cheap to convert!

Some numbers you may be able to use: A Square Dadant hive full of honey weighs 120 to 130 pounds. Each frame will weigh roughly nine pounds of which eight pounds is honey. If the frames are spaced wider to get fatter combs, they can weigh 12 to 14 pounds each.

I've been keeping bees since 1969 along the way trying out several things such as 31mm end bars on my frames. When I converted to square Dadant, I made the decision to use 31mm frames with 14 frames fitting in a single Square Dadant box. Spring buildup is roughly 25% faster with narrow frames and 5.1mm cells. This is because a given size cluster on narrow frames and 5.1 cells covers about 25% more frame area. The negative of this is that rapid buildup can lead to early swarming. I split strong colonies in early Spring and usually get a crop of honey from both the parent and the split. This turns an otherwise undesirable trait (swarming) into a useful way to increase colonies. If you read Dadant's book, you will find they used 1.5-inch frame spacing specifically because it reduces Spring swarming. Choice of frame spacing should be based on how the bees will be managed. Narrower spacing favors early buildup which requires splitting. Wider spacing favors slower buildup which reduces swarming tendency. This is an important aspect of managing your colony so do some due diligence. **https://www.beesource.com/threads/the-making-of-a-frame-with-side-discussion-of-frame-rests-bee-space-and-langstroth.325986**

Square Dadant advantages:

1. There are only 14 frames to examine to find a queen, inspect, etc.
2. All of the brood a prolific queen can produce will fit in one brood box.
3. It has enough room for wintering in one box, if using Buckfast queens, they can easily Winter on seven frames at 50 pounds of honey.
4. It can run a horizontal two queen system using a divider.
5. It reduces crowding effects, so the bees are less likely to swarm.
6. The wide entrance improves ventilation.
7. The brood nest is more consolidated instead of being spread across multiple boxes of combs.
8. My extractor was made to handle this size comb, the frames fit my existing system to extract.

9. Easy to use to produce queens, just put a horizontal divider in place like a cloake board and have at it.
10. It allows me to re-use the shallow extracting frames I already have, just add square supers.
11. It is highly efficient for space utilization.
12. It costs less for a complete working hive than any other movable frame stackable super designs.
13. It is much less likely to blow over in a strong wind.
14. Square modified Dadant hives can easily be palletized.
15. Can turn the supers 90 degrees so the bees fill them evenly and mature the honey all at one time.
16. Provides clustering space at night and in rainy weather reducing swarming triggers.
17. Diverts foragers from the broodnest directly into the supers.
18. Can easily adjust the number of brood frames to fit the queen's ability.

Detriments

1. A box full of honey will weigh a bit over 100 pounds, not good for the back.
2. These are obviously not standard which is a detriment if I ever sell out.
3. Equipment is not normally available in the U.S., so I have to custom build the frames and other hive components.
4. Splitting has to be done by moving frames instead of separating boxes.
5. Sourcing foundation and queen excluders can be a bit difficult.
6. Most modern extractors can't handle 11¼ inch deep frames.

Best wishes for the new year,
Darrel Jones

The hive on the left produced 120 pounds of honey, the hive on the right raised three queens for other hives.

11¼" frame on top of some square excluders.

Filling a super with frames, hold 13 shallow frames, but I usually run 11 or 12 for honey.

A deep brood box with 14 frames.

Side of the brood nest comb with some brood from the same hive.

Newly drawn comb on a strong Spring flow.

NEXT MONTH

Region 1
- Requeen failing colonies
- Extract surplus honey
- Feed during late Summer dearth
- Alcohol samples for mites. Treat if above 3 per 100 bees
- Winter bees will start being produced. Treat for mites
- Add supers

Region 2
- *Varroa*/Sample/Treat/Sample
- Feed if dearth
- Check queen brood production
- Get ready for Fall flow
- Add supers for Fall flow
- Mite treatments should be done by now

Region 3
- *Varroa* alcohol wash/treat if above 3 per 100 bees
- Feed if needed
- Make Fall splits
- Control SHB
- Extract honey

Region 4
- Add supers for Fall flow
- Check hive weight
- *Varroa, varroa, varroa*
- Pull supers if full
- Requeen weak colonies
- Rotate boxes
- Put mouse guards on

Region 5
- Complete mite sample and treatment
- Check colony weight
- Take Fall honey off
- Add Fall supers if needed
- Requeen if needed
- Check colonies for disease
- Cull old dark combs after extraction

Region 6
- Treat for *varroa*, then sample again
- Honey extraction time
- Feed syrup if needed
- Take supers off to extract
- Requeen weak colonies

Region 7
- Sample/treat/sample for mites (waaay too early for OA)
- Feed pollen sub
- Check colony size and brood pattern
- Check colony weight
- Feed syrup if needed
- Requeen before Winter

Honey Reporters Wanted

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

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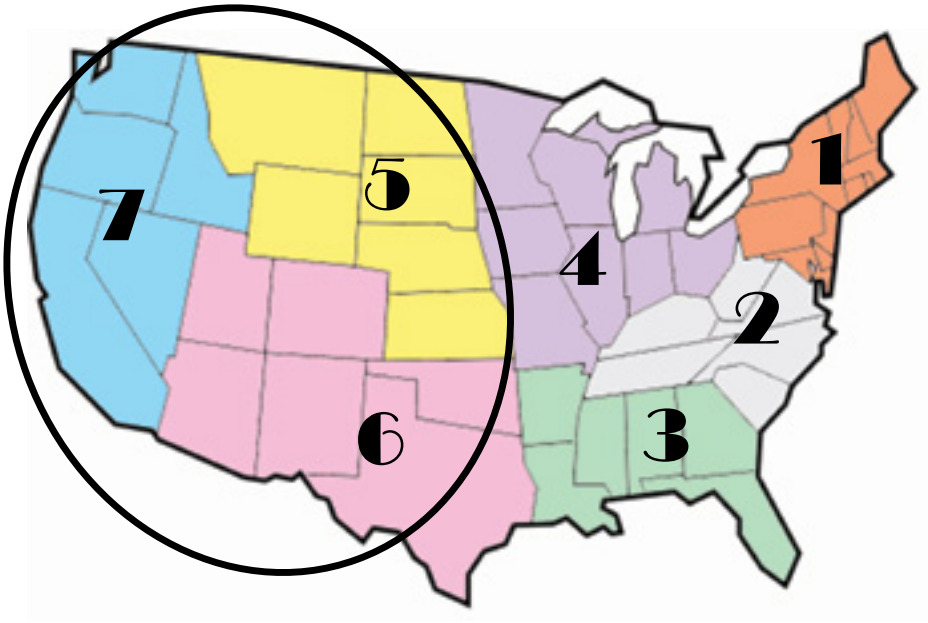

AUGUST – REGIONAL HONEY PRICE REPORT

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7					
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								Range	Avg.	$/lb	Last Month	Last Year
55 Gal. Drum, Light	2.34	2.20	3.43	2.80	2.55	3.10	2.20	2.00-4.00	2.65	2.65	3.39	2.10
55 Gal. Drum, Ambr	2.12	2.17	2.75	2.71	-	2.50	1.95	1.90-3.50	2.45	2.45	3.10	2.12
60# Light (retail)	217.78	219.56	283.33	187.50	210.00	199.00	205.00	120.00-450.00	219.66	3.66	215.58	206.01
60# Amber (retail)	221.00	218.90	262.50	197.25	-	189.00	218.75	120.00-300.00	218.53	3.64	213.34	197.92
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	98.53	109.53	75.77	87.00	64.80	-	-	49.54-144.00	95.46	7.95	102.75	93.49
1# 24/case	148.45	193.27	159.10	117.05	160.06	126.96	144.00	96.00-288.00	150.75	6.28	145.14	144.57
2# 12/case	165.03	227.00	142.72	105.13	123.84	-	156.00	84.00-336.00	151.27	6.30	147.75	126.64
12.oz. Plas. 24/cs	124.63	145.20	134.04	96.35	89.76	119.76	117.60	72.00-240.00	118.54	6.59	116.61	105.52
5# 6/case	155.11	221.27	123.36	118.93	123.84	-	-	21.50-330.00	153.05	5.10	154.41	143.54
Quarts 12/case	166.00	173.46	157.00	143.31	192.18	123.00	205.50	28.20-276.00	167.04	4.64	175.19	170.66
Pints 12/case	100.00	140.00	101.33	97.86	138.00	-	115.20	60.00-180.00	112.05	6.22	100.71	96.63
RETAIL SHELF PRICES												
1/2#	5.97	6.93	5.46	5.70	4.00	7.50	6.00	3.00-10.00	6.12	12.24	5.97	5.49
12 oz. Plastic	7.59	7.63	7.07	6.72	5.60	10.60	5.92	3.25-16.00	7.35	9.80	6.88	6.48
1# Glass/Plastic	9.81	10.08	9.53	8.04	9.20	11.17	9.67	5.00-19.50	9.60	9.60	8.89	8.74
2# Glass/Plastic	15.65	18.99	17.67	14.37	15.40	-	15.50	7.85-30.00	16.33	8.17	15.78	14.82
Pint	11.54	13.22	11.79	13.12	10.00	8.50	8.25	4.00-22.00	11.91	7.94	10.93	10.88
Quart	20.14	21.73	19.86	20.89	17.33	25.00	20.17	8.00-42.00	20.86	6.95	19.95	19.09
5# Glass/Plastic	59.95	37.24	38.49	26.80	30.75	34.00	-	18.00-500.00	46.45	9.29	31.88	33.62
1# Cream	11.68	12.38	8.29	10.33	12.00	-	12.00	6.19-20.00	11.38	11.38	11.46	9.75
1# Cut Comb	13.90	11.33	16.67	13.88	-	-	-	5.00-25.00	13.92	13.92	14.11	12.55
Ross Round	9.67	12.45	-	10.00	-	12.75	14.75	6.50-18.00	11.91	15.88	12.95	11.91
Wholesale Wax (Lt)	8.67	10.75	5.66	6.72	6.00	5.25	9.70	2.65-17.00	8.15	-	8.36	6.79
Wholesale Wax (Dk)	6.43	6.75	2.50	7.36	-	4.00	3.00	2.50-15.00	6.09	-	6.55	5.52
Pollination Fee/Col.	77.22	72.00	66.67	141.25	-	-	50.00	40.00-250.00	83.00	-	101.41	98.42

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.

Many have asked, so here's our answer! We are now posting our monthly Regional Honey Price Report online (**https://www.beeculture.com/monthly-regional-honey-price-report/**), free to access for anybody. This way if your magazine is late, you can access it on time, or if you're out and about, you can pull it up on your phone! Every month on the first of the month, we will post the same table of information above. If for some strange reason you don't subscribe to *Bee Culture* (which we know is crazy to say, but if you aren't please subscribe using the card in the magazine, or by going to **www.BeeCulture.com**) the report consists of 24 different options for honey broken down into seven regions.

On the previous page, you will see a map of our regions. Within each region, we have many reporters who live in those states send us a report with the prices that they see and/or sell. With all of that information, we then average the total of all responses and that's where we get our listed prices! If you are interested in contributing please fill out this form: **https://forms.gle/qai8NFY2th3a4c696** All reporters who are returning forms will receive a free subscription to *Bee Culture*!

There are two ways to get to the monthly report. Option 1 is under the "Resources" tab. If you hover on that, you will see a tab that says "Monthly Regional Honey Price Report" just click that and you will see a master list of all the months that are available! For our mobile users, click on the three lines at the top and you will see it listed under Resources. Option 2 is under "Latest Issues." If you click that and then the issue you would like to see, there will be a link to that month's report. This is best if you know the specific month. Or to make it really simple, click here to go to the master page: **https://www.beeculture.com/monthly-regional-honey-price-report/**

Please note that we are actively still adding the reports from the past. The plan is to go back to 2015, but it's a long process so bear with us. Don't worry though, we made sure to add all of what we have of 2022 thus far to make sure you can see the most current information. And make sure to check back on the first for the next report!

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

STUDY HALL

WEED KILLER and BEES

QUESTION

If I spray to kill Johnson Grass on my farm, will I potentially harm my bees? Is there someone that can guide me here? I asked the USDA and they said "use Roundup to kill Johnson grass." Same advice from all ranch stores in the area. Roundup has glyphosate in it.

Glen

ANSWER

The key here is not to spray or expose colonies to weedkiller directly or indirectly. There are several studies out there that show many times it is not the active ingredient which may negatively impact pollinators but the inactive/inerts like surfactants and adjuvants. These generally do not need regulatory approval so there is a major overlooked issue. The simple universal answer is do not spray pollinator friendly blooming plants that honey bees or any other pollinators are, or will be foraging on and/or directly on colonies or facilitate spray drift to colonies or blooming plants. If they are not exposed then all is well. 'The dosage makes the poison.'

PACKAGE BEE DIFFERENCES

QUESTION

Started two packages at the same time, fed them the same, they are in the same area, but one is two frames ahead of the other one. No mites or

beetles as of right now. There are no other hives within five miles of me. Both are laying and the pattern of the brood is good. Should I replace the queen at this time? Or is this normal? I know (like anything) bees aren't all the same.

Peter

ANSWER

It could be the queen is laying less for a multitude of reasons (fertilization/heat/cold exposure, chemicals etc., etc.), or that the workers in the original package were older and could not refocus on being 'nurse' bees which provide food for their developing sisters or any number of environmental inputs as the foragers were interacting with it.

I would give the queen another few weeks to see how the slower colony evolves in comparison to your other one.

Welcome to beekeeping😉 We love diversity in 2022 and honey bees are it.

OA and GLYCERIN

QUESTION

Wondered what your thoughts are on the "alternate" OA dribble method where you mix warmed food grade glycerin and OA, wet a disposable (blue) shop towel, lay it on top of the frames of the lowest brood super and forget it.

Reportedly, takes the bees three weeks to rip up the towel and throw it out of the hive, so both capped, and uncapped bees get a chance to walk through it.

Reports are it has gone to the EPA for approval.

Barbara

ANSWER

As you have heard me say before, killing a little bug (*Varroa*) on a big bug (Honey Bee) is a tough job from a collateral pesticide damage perspective and a delivery perspective. To get any *Varroa* miticide delivered to and into an individual *Varroa* mite in a directed consistent fashion and have some control effect has been the difficult and inconsistent product development challenge.

For most *Varroa* control products, the individual *Varroa destructor* mite has to be in the life stage of an adult exposed (phoretic) in the active honey bee colony itself and not hiding in a worker or drone bee development cell. *Varroa* has to have the pesticide come in contact with them, enter their body and cause some damage. Damage happens to the honey bees exposed as well but 'the dose makes the poison,' so there is harmful chronic collateral damage to the honey bee, as the dose to them is lower, but less acute damage where one sees significant death. That is ALL assuming the user is using a labeled product and following the label directions.

Oxalic acid mixed with glycerin has not been approved as a *Varroa* control product simply because data indicate that its use is inconsistent, i.e. it doesn't work all the time. Perhaps in time the delivery of it will be

From the Editor, Jerry Hayes

refined and its use be approved and a product labeled. But as of right now it is not and anyone using it will be violating Federal and State Law while gambling with the health of their bees.

STORED FOOD CONSUMPTION

QUESTION

Jerry, I'm already thinking about Winter… sorry. Is it correct when I say that overwintering bees consume less honey in cold weather than milder weather, yes? No fly, less honey consumption, correct?

Ed

ANSWER

Ugh, I don't want to think about Winter!

When it gets below about 57°F, honey bees start to burn up a lot of calories by movement/shivering, if you will. That is why 'Winter bees' are different than Summer bees, having larger fat bodies for stored energy when they are in a cluster and access to stored honey is reduced. They use the stored fat bodies as a 'fuel' resource to produce heat and keep the colony and most important the queen alive and healthy.

The largest use of stored honey and why it is stored is brood rearing, which begins early in the new year. That is why bees sometimes starve to death about February/March in the north in particular, because brood rearing picks up, nothing is blooming and honey reserves are depleted. Nurse bees need it to produce liquid food for their sisters and after a few days it is used directly to mix with beebread to feed larvae.

SHB ENTRANCE DEVICE

QUESTION

I have a question about using a specialized entrance to reduce the ability of the hive beetles to access the hive.

I'm curious if you have any experience with these. You mentioned some scientific papers that addressed their use.

Marcus

ANSWER

I am sure it may help reduce SHB entrance into a colony to some degree, but here are some of my thoughts.

SHB are being attracted to a colony because it is emitting stress pheromone odors because it is weakening because of *Varroa*, AFB, EFB etc,. and population is dropping. SHB is looking for a place for to reproduce. If you do not have a honey bee on every inch of comb, then they cannot protect/police the hive from SHB laying eggs. SHB pick up these stress odors from miles away and locate the colony or the apiary where colonies are mismanaged.

If you look at the many videos on the web, they are using perfect new equipment with no cracks, spaces or misfitting hive parts leaving openings i.e. SHB entrances. Mine are not like that😊

These devices are supposed to be mounted on a standard wooden entrance. If you notice they say because the device is reducing the entrance so much to install an upper entrance so ventilation can happen in hot weather. Another device to buy because the reducers cause other problems.

One of the reasons it may help reduce SHB incursions is because you have cut the entrance width in half or more. Less area for SHB to enter on this perfect new equipment.

I think the best defense against SHB is to have healthy strong colonies because *Varroa*/*Varroa* Virus Legacy is controlled, queens are fecund and additional diseases and pests are not an issue. Easier said than done sometimes.

If you want to buy a couple of these and test them out I am sure it would be fun to do. And that is part of hobby beekeeping. If it isn't fun, don't do it. But, remember *Varroa*/*Varroa*/*Varroa*… sample, treat if needed, then sample again to see if it worked.

Are Your Colonies Ready to Overwinter?

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

1. MONITOR MITE LEVELS

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

2. TREAT FOR VARROA MITES

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

3. ENSURE PROPER FEED

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

4. WRAP YOUR HIVES WELL

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

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

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Submitted by: Jeff Server

Submitted by: Jeff Server

Image Gallery

Swarms & Splitting Colonies

Swarm call in the suburbs. Submitted by: Victor Gilliam

They landed on my bait hive, but it took them most of the night to go in. Submitted by: L Eric Smith

Submitted by: Jeff Server

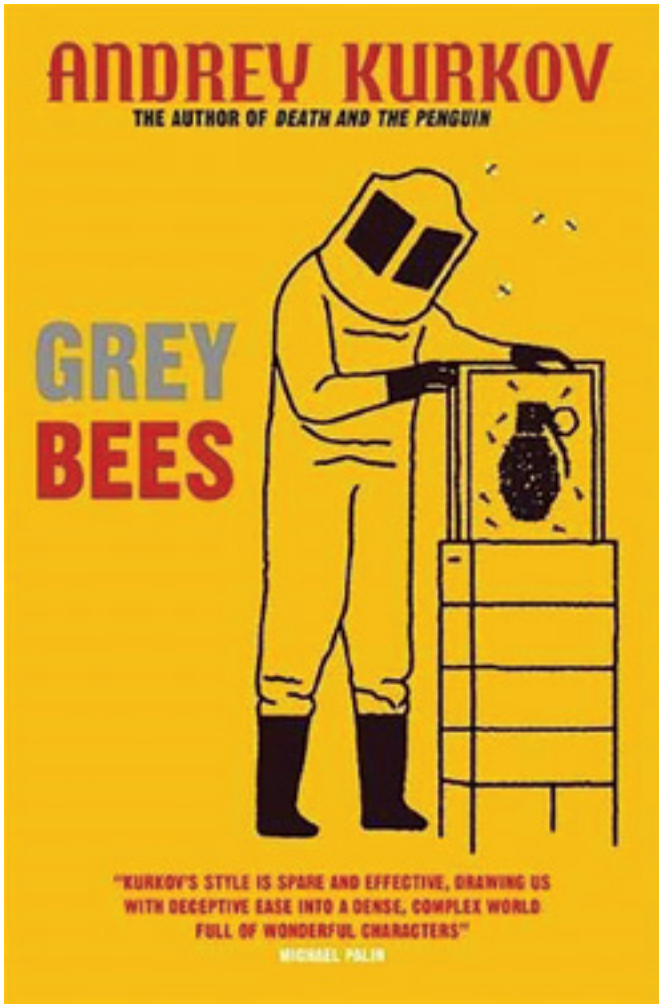
Submitted by: Jeff Server

Book Review

Mark Winston

The recent full-on Russian invasion has focused and heightened attention on Ukraine and distinctive aspects of its culture, among other things bringing Ukranian writers to wider attention. *Grey Bees*, by Ukranian author Andrey Kurkov, is one recent Ukranian novel that has been working its way up the best-seller lists, in part because of the invasion, but also because it's quite a good read.

Grey Bees was first published in 2018, with an English translation by Boris Dralkyuk published in May 2022. It was written after Russian troops invaded Crimea in February 2014, which then declared its independence from Ukraine, while pro-Russian separatist forces in Donbas, a region in eastern Ukraine, continued to battle with the Ukranian military. The separatists were and continue to be supported by Russia.



The book opens in the grey zone, the contested area in Donbas between separatist and Ukranian forces, a few years before the current country-wide invasion. The main character of the novel, beekeeper Sergeyich, is one of the last remaining inhabitants in a small and mostly abandoned grey zone village, from which most of the residents had fled. To be clear, this isn't a book primarily about bees or beekeeping, but rather uses bees as a plot element to get Sergeyich moving across the regions, and as a thematic element upon which to hang the book's exploration of the impact the war has had on its human victims.

Grey Bees follows Sergeyich and his six honey bee colonies from his village through the grey zone border into Ukraine, then across the Russian border into Crimea. He's moving his bees so they can forage in a more peaceful location.

Beekeeping, and attitudes about bees, feel quite different in *Grey Bees* than the North American norm. For one thing, Sergeyich only has six hives, yet his most prominent personal identity is firmly as a beekeeper. The honey his bees produce is more valuable than North American honey, in part because banks and the post office are non-functional in the grey zone, and cash is hard to come by, so Sergeyich uses his honey to barter for food and petrol.

Sergeyich trades some jars of honey for food at a local grocery store after he moves his bees into Ukraine. The store owner invents a unique value-added marketing strategy, adding stinging nettles to the honey. She then sells it as an anti-alcohol treatment to help customers sober up, and jacks up the price. Based on the copious drinking of vodka represented in the book, I suspect that honey jumped off the shelves.

Honey bees are instilled with personalized and therapeutic qualities in *Grey Bees*, and beekeeping inbued with folk traditions. One ongoing motif in the book is Sergeyich grouping his colonies and placing a board covered with a thin mattress across the hives so that he and others can sleep on the bees.

Before the war, customers would come from all over the region and pay Sergeyich for the opportunity to nap on his hives, believing sleeping on top of the bees was relaxing as well as curative for countless ailments. Sergeyich himself wakes up one morning with no feeling in his left arm, and rather than go to the hospital for medical attention he spends the next night sleeping on his bees, waking up cured.

Kurkov addresses the dimensions of why we keep bees, and how, which in North America tends more towards the utilitarian and productive than the spiritual. He writes of Sergeyich's light-touch management philosophy:

He wasn't merely the owner of an apiary – he was the representative of the legitimate interests of its bees. The bees, of course, had just one interest: gathering nectar and pollen. Sergeyich regarded the internal rules of their life (relations between the worker bees and the drones, all that petty, everyday nonsense) to be their personal business, the same as with people... They never asked his advice on what to do or how to do it. They didn't need his advice, or his permission.

The title "Grey Bees" is a double entendre, referring in part to Sergeyich's home apiary being in the grey zone, but also to the grey, or mountain, bee, a honey bee type found in the Carpathian Mountains, ranging through central and eastern Europe, including Ukraine.

Beekeeping in Ukraine has a long and storied history, including the notable **Petro Prokopovych**, generally credited with inventing the first movable frame hive in 1814, as well as the queen excluder. Today Ukraine is one of the top five honey producing countries in the world, and reports 400,000 beekeepers out of its total population of 46 million people.

There doesn't seem to be a scientific consensus about whether the


Carpathian Bees


Ukrainian Apiary

Carpathian honey bee is a separate subspecies, *Apis mellifera carpatica*, or a variety of carniolan, *Apis mellifera carnica var. carpatica*. However the taxonomists dice and slice it, the Carpathian and carniolan bees have similar characteristics, including a dusky greyish colour. Both types are reported to Winter well in cold climates in small clusters, with brood rearing and adult populations expanding rapidly in the Spring. They are also reputed to be hygienic, resistant to pathogens and gentle.

North Americans tend to be less obsessive about the subspecific purity of queens than European (including Russia and Ukraine), British and Irish beekeepers. I have heard passionate arguments when visiting those countries concerning if and how to maintain honey bees with local genotypes; if you want to hear the Irish at their most voluble, just mention the Irish Black Bee among beekeepers at the pub, and duck.

American and Canadian beekeepers generally are less excitable about honey bee genetics, perhaps because honey bees are not native to North America, and our bees are mixed lineages. Still, some pure lines are maintained by North American breeders, with **carniolans** being of particular interest.

The Carpathian honey bee has recently attracted some attention in Canada, which has a cold climate and short Summer season similar to the Carpathian Mountains. Canada imports queens under permits from only a few countries, including the United States, Malta, New Zealand, Chile, Australia, Italy and Ukraine. A Canadian beekeeping operation, **Niagara Beeway**, has been importing Carpathian queens the last few years, in the hopes of servicing the market for queens and package bees in the coldest Canadian beekeeping regions, particularly those with short growing seasons. They also sell to queen breeders, who have been experimenting with various hybrid combinations of Carpathian, Carniolan and Italian bees.

The Russian invasion prevented most importations in the Spring of 2022, although a few queens made it out of Ukraine into western Canada. This past Spring the Carpathian Valley, where Niagara Beeway's queens were reared, has been the scene of intense hostilities, and two of the drivers for the Ukranian apiaries who were returning from the airport with donated medical equipment were shot.

According to George Scott, head of Niagara Beeway, the Russians have been specifically targeting any Ukranian business with income from abroad, and it's simply been too dangerous to make the seven-hour drive from the Carpathian Valley to the airport where the queens are usually shipped. However, the war in the west has now shifted to the eastern Donbas region, and Scott is hopeful there will be a queen shipment to Canada this July.

The toll the war in Ukraine has taken on beekeeping is but a sliver of the daily tragedies represented in *Grey Bees*. Still, Kurkov's Sergeyich finds some solace in his bees, their behavior making more sense to him than that of the people around him.

There are some lovely passages in the book imbuing bees with their own clarity of purpose, contrasting with human behavior. Let's give Sergeyich the last word:

Bees don't understand what war is. Bees can't switch from peace to war and back again, as people do. They must be allowed to perform their main task – the only task in their power – to which they were appointed by nature and by God: collecting and spreading pollen. That's why he had to go, to drive them out to where it was quiet, where the air was gradually filling with the sweetness of blossoming herbs, where the choir of these herbs would soon be supported by the choir of flowering cherry, apple, apricot and acacia trees.

Mark L. Winston is a Professor and Senior Fellow at Simon Fraser University's Centre for Dialogue. His recent books have won numerous awards, including a Governor General's Literary Award for *Bee Time: Lessons from the Hive*, and an Independent Publisher's Gold Medal for *Listening to the Bees*, co-authored with poet Renee Sarojini Saklikar.

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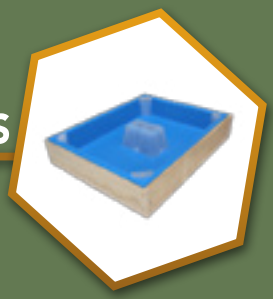

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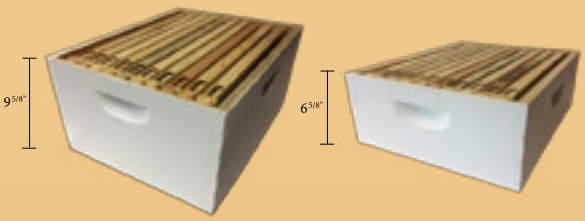

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FOUND IN TRANSLATION

Herbal medicine for bees?

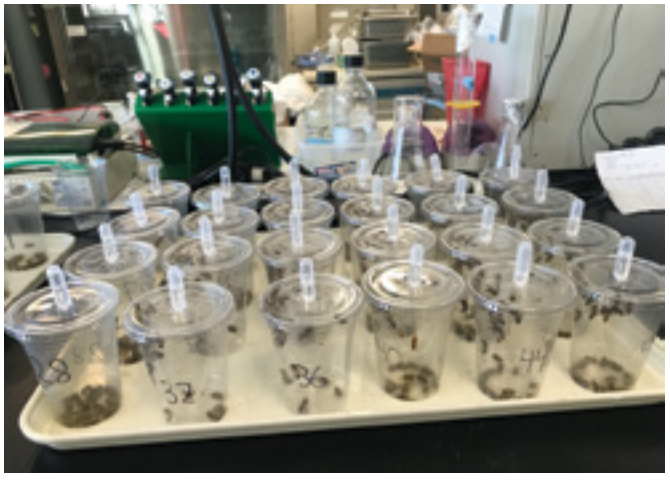
Jay Evans, USDA Beltsville Bee Lab

Bees have been reliant on plants, and vice versa, for tens of millions of years. Similarly, beekeepers have known from the start of managed beekeeping that the quantity and quality of floral resources determine both the growth of their colonies and the bounty of extractable resources.

There is also a growing interest in the medicinal properties of certain plant products for bee health (and of course the health of humans and other consumers). In my world, the push for plants as bee medicines came from friends and colleagues looking at floral needs of, not honey bees but, bumble bees. Drs. Lynn Adler (University of Massachusetts) and Rebecca Irwin (North Carolina State University) are ecologists who have been on this beat for nearly two decades, looking at the costs and benefits of certain plant nectars and pollens for bumble bee health. Dr. Adler and colleagues recently published an excellent review of the history and evidence behind this thinking, describing work from their own labs and that of many others in the freely available article *Understanding effects of floral products on bee parasites: Mechanisms, synergism, and ecological complexity* (2022) International Journal for Parasitology: Parasites and Wildlife 17 244–256, **https://doi.org/10.1016/j.ijppaw.2022.02.011**.

The work with bumble bees and their natural floral resources is exciting but many of us in the honey bee world are more interested in applying this approach to a feed or forage regime that reduces the impacts of parasites and other stressors that hurt honey bees. Is there something in here for beekeepers and honey bees? As with most science, the answer is going to be 'most likely'!

Harnessing the power of plant chemistries for honey bee health requires a grasp of 1) floral chemistries (individual molecules or the soup found in pollens and nectars), 2) bee responses to chemicals, and 3) the responses of specific bee parasites and pathogens to the same chemicals. In the paper above, the scientists do a great job of summarizing the former, pointing to dozens of studies that have determined plant contributions to bee health. These studies describe the effects of individual chemicals as well as the more typical bouquet of compounds found in even single-species nectar and pollen provisions. In a groundbreaking paper showing how plant chemicals tweak key elements of bee physiology, Wenfu Mao and colleagues showed that a few chemicals abundant in pollens can trigger both a more active immune response and a suite of proteins bees use to detoxify the pesticides they interact with (Mao, W., Schuler, M.A., Berenbaum, M.R. (2013) *Honey constituents up-regulate detoxification and immunity genes in the western honey bee* Apis mellifera. Proc. Natl. Acad. Sci. Unit. States Am. 110, 8842–8846. **https://doi.org/10.1073/pnas.1303884110**). The latter deserves its own discussion and is quite exciting, while the former provides support for the use of specific plant sources, or plant chemicals, to treat widespread disease.



In searching for plant-based cures of bee disease there are at least two camps. A more holistic approach involves choosing specific plant sources with known biological activities and then feeding bees the chemicals extracted from these plants via a solvent like alcohol or via water. Work by Claudia Pasca and colleagues highlights this approach, showing that crude plant extracts have a range of possibly interesting compounds and that such extracts from single plants or in multi-plant soups can reduce bacterial disease agents and chalkbrood outside of bees, and nosema loads when fed directly to bees (Pasca, C.; Matei, I.A., Diaconeasa, Z., Rotaru, A., Erler, S., Dezmirean, D.S. (2021) *Biologically active extracts from different medicinal plants tested as potential additives against bee pathogens*. Antibiotics vol. 10, 960, **https://doi.org/10.3390/antibiotics10080960**). This work is mirrored by work from Paul Stamets and colleagues wherein water- or alcohol-based extracts derived from mushrooms led to reduced virus loads in bees (*Extracts of polypore mushroom mycelia reduce viruses in honey bees* (2018). Sci Rep 8, 13936 **https://doi.org/10.1038/s41598-018-32194-8**) and the rich evidence that plant resins (propolis when

collected by bees) contain chemicals that can reduce disease.

Some of us are more narrow, or perhaps less botanical, and we favor simply exposing bees and their ailments to one chemical at a time in hopes of finding a simple solution to bee disease. Our lab has tested over 100 individual plant-derived chemicals for their effects on bee viruses and, while we can't claim to have cured viral disease on all fronts, we have found certain ones that do reduce disease levels. Dawn Boncristiani led a paper summarizing a few years of these efforts (Boncristiani, D.L., Tauber, J.P., Palmer-Young, E.C., Cao, L., Collins, W., Grubbs, K., Lopez, J.A., Meinhardt, L.W., Nguyen, V., Oh, S., Peterson, R.J., Zamora, H., Chen, Y., Evans, J.D., (2021) *Impacts of diverse natural products on honey bee viral loads and health.* Applied Science 11, 10732. **https://doi.org/10.3390/app112210732**). Even this one-chemical-at-a-time approach is a work in progress, and while some classes of chemicals appear promising across different studies it remains too early for beekeepers to buy and treat with these plant solutions.

Along with pointing the way to possible medicines, this line of work suggests that, while numerous sugar sources will suffice to boost bee energy, honey is truly the bees' knees for bee health. Also, not all plant sources are alike and providing specific plants as nectar or pollen sources might someday be a cost-effective way to improve colony health. Can this be done at a large scale? Can more be done to help bees locate and key in on specific flowers? Will bees seek out specific plants when they have a need for medication? The latter trait, 'self-medication,' is known for a range of insects but the evidence that it is a widespread ability of honey bees is sparse. As a hint that bees have such abilities, Bogdan Gherman and colleagues found that bees infected with nosema favored specific nectars from a cafeteria of choices *(Pathogen-associated self-medication behavior in the honey bee* Apis mellifera, Behavioural and Ecological Sociobiology (2014) 68:1777–1784; **DOI 10.1007/s00265-014-1786-8**). How this ability translates to foraging decisions by worker bees remains unknown and other studies have not seen a similar passion for medicinal flowers when bees are infected with viruses and other threats. While an army of scientists tries to identify specific plant compounds, extracts or mixes that beekeepers might target for improved honey bee health, we have already learned much about the widespread honey bee health impacts of clean, abundant and diverse forage.

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A Closer LOOK

Division of Labor

Clarence Collison

Individual workers perform different tasks at different ages.

Colony life is organized by a complex and sophisticated division of labor. "Individual workers perform different tasks at different ages. Age-related division of labor is based on a form of behavioral development by workers known as age polytheism. Young individuals perform tasks in the nest such as brood care and nest maintenance, and then venture outside to collect food and defend the nest when they get older" (Robinson and Huang 1998).

After emergence as adults, usually the worker bees first clean cells, and as they age, they feed the larvae and queen, process and store food, secrete wax and construct comb, and guard the entrance. The most prominent behavioral change is observed when the bees are about three weeks old, the age when they start foraging (Seeley and Kolmes 1991). Plasticity is an important attribute of division of labor and colonies respond to changes in the internal and external environment by manipulating the ratios of individual workers involved in different tasks. Such plasticity in division of labor can be partially attributed to behavioral flexibility of the individual workers (Robinson 1992; Sagili et al. 2011).

There is a genetic component to plasticity in age polytheism in honey bee colonies, such that workers of some genotypes become precocious foragers more readily than workers of other genotypes, in colonies lacking older bees. Using colonies composed of workers from two identifiable genotype groups, we determined that intracolony differences in the likelihood of becoming a precocious forager are a consequence of differences in rates of behavioral development that are also evident under conditions leading to normal development. An alternative hypothesis, that differences in the likelihood of becoming a precocious forager are due to differences in general sensitivity to altered colony conditions, was not supported. In three out of three trials, workers from the genotype group that was more likely to exhibit precocious foraging in single cohort colonies also foraged at relatively younger ages in colonies in which workers exhibited normal behavioral development. In contrast, in three out of three trials, workers from the genotype group that was more likely to exhibit precocious foraging in single cohort colonies did not show disproportionately more overaged nursing in colonies in which workers exhibited delayed development. These results indicate that genotypic differences in plasticity in age-related division of labor are based on genotypic differences in rates of behavioral development (Giray and Robinson 1994).

Brillet et al. (2002) measured the age at onset of foraging in colonies derived from three races of European honey bees, *Apis mellifera mellifera*, *Apis mellifera caucasica* and *Apis mellifera ligustica*, using a cross-fostering design that involved six unrelated colonies of each race. There was a significant effect of the race of the introduced bees on the age at onset of foraging: cohorts of *A. m. ligustica* bees showed the earliest onset, regardless of the race of the colony they were introduced to. There also was a significant effect of the race of the host colony: cohorts of bees introduced into *mellifera* colonies showed the earliest onset of foraging, regardless of the race of the bees introduced. Significant inter-trial differences also were detected, primarily because of a later onset of foraging in trials conducted during the Autumn (September-October). These results demonstrate differences among European races of honey bees in one important component of colony division of labor.

The age at which worker honey bees begin foraging varies under different colony conditions. Previous studies have shown that juvenile hormone (JH) mediates this behavioral plasticity, and that worker-worker interactions influence both JH titers and age at first foraging. These results also indicated that the age at first foraging is delayed in the presence of foragers, suggesting that colony age demography directly influences temporal division of labor. Huang and Robinson (1996) tested this hypothesis by determining whether behavioral or physiological development can be accelerated, delayed or reversed by altering colony age structure. In three out of three trials, earlier onset of foraging was induced in colonies depleted of foragers, compared to colonies depleted of an equal number of bees across all age classes. In two out of three trials, delayed onset of foraging was induced in colonies in which

foragers were confined compared to colonies with free-flying foragers. Finally, in three out of three trials, both endocrine and exocrine changes associated with reversion from foraging to brood care were induced in colonies composed of all old bees and devoid of brood; JH titers decreased and hypopharyngeal glands regenerated. These results demonstrate that plasticity in age-related division of labor in honey bee colonies is at least partially controlled by social factors.

Efficient division of labor is one of the main reasons for the success of the social insects. In honey bees the division of labor is principally achieved by workers changing tasks as they age. Typically, young adult bees perform a series of tasks within the colony before ultimately making the transition to foraging outside the hive for resources. This lifelong behavioral development is a well-characterized example of naturally occurring behavioral plasticity, but its neural bases are not well understood. Two techniques were used to assess the role of biogenic amines in the transition from in-hive work to foraging, which is the most dramatic and obvious transition in honey bee behavioral development. First, associations between amines and tasks were determined by measuring the levels of amines in dissected regions of individual bee brains using HPLC analysis. Second, colonies were orally treated with biogenic amines and effects on the onset of foraging were observed. Octopamine concentration in the antennal lobes of the bee brain was most reliably associated with task: high in foragers and low in nurses regardless of age. In contrast, octopamine in the mushroom bodies, a neighboring neuropil, was associated with age and not behavior, indicating independent modulation of octopamine in these two brain regions. Treating colonies with octopamine resulted in an earlier onset of foraging in young bees. In addition, octopamine levels were not elevated by non-foraging flight, but were already high on return from the first successful foraging trip and subsequently remained high, showing no further change with foraging experience. This observation suggests that octopamine becomes elevated in the antennal lobes in anticipation of foraging and is involved in the release and maintenance of the foraging state. Foraging itself, however, does not modulate octopamine levels. Behaviorally related changes in octopamine are modulated by juvenile hormone, which has also been implicated in the control of honey bee division of labor. Treatment with the juvenile hormone analog methoprene elevated octopamine and octopamine treatment 'rescued' the delay in behavioral development caused by experimentally depleting juvenile hormone in bees. Although the pathways linking juvenile hormone and octopamine are presently unknown, it is clear that octopamine acts 'downstream' of juvenile hormone to influence behavior and that juvenile hormone modulates brain octopamine levels. A working hypothesis is that octopamine acts as an activator of foraging by modulating responsiveness to foraging-related stimuli. This is supported by the finding that octopamine treatment increased the response of bees to brood pheromone, a stimulator of foraging activity. Establishing a role for octopamine in honey bee behavioral development is a first step in understanding the neural bases of this example of naturally occurring, socially mediated, behavioral plasticity. The next level of analysis will be to determine precisely where and how octopamine acts in the nervous system to coordinate this complex social behavior (Schulz et al. 2002).

Forager honey bees have higher brain levels of octopamine than do bees tending larvae in the hive. To test the hypothesis that octopamine influences honey bee division of labor, they treated bees orally with octopamine or its immediate precursor tyramine and determined whether these treatments increased the probability of initiating foraging. Octopamine treatment significantly elevated levels of octopamine in the brain and caused a significant dose-dependent increase in the number of new foragers. This effect was seen for precocious foragers in single-cohort colonies and foragers in larger colonies with more typical age demographies. Tyramine treatment did not increase the number of new foragers, suggesting that octopamine was exerting a specific effect. Octopamine treatment was effective only when given to bees old enough to forage, i.e., older than four days of age. Treatment when bees were one to three days of age did not cause a significant increase in the number of new foragers when the bees reached the minimal foraging age. These results demonstrate that octopamine influences division of labor in honey bee colonies. They speculate that octopamine is acting in this context as a neuromodulator (Schultz and Robinson 2001).

Molecular analysis of a complex behavioral phenotype is facilitated by dissecting it into simpler behavioral components. Using this approach, Ben-Shahar et al. (2004) present evidence implicating increased manganese transport by the *malvolio* (mvl) gene into brain cells as one factor that influences age-related division of labor in honey bee colonies. They studied mvl because manganese affects sucrose responsiveness in *Drosophila melanogaster* (fruit flies), and sucrose responsiveness is related to division of labor in honey bee colonies. Honey bee foragers are more responsive to sucrose in the laboratory than are younger nurse bees, and pollen foragers are more responsive to sucrose than nectar foragers. Levels of mvl mRNA in the brain and manganese in the head were higher in pollen foragers compared with nurses, with nectar foragers intermediate. Manganese treatment increased honey bee sucrose responsiveness and caused precocious foraging. Manganese levels showed a similar pattern to mvl mRNA

but manganese treatment did not increase pollen foraging. These results suggest that, while there are molecular pathways common to sucrose responsiveness and division of labor, linkages between a complex behavior and some of its simpler behavioral components are not obligatory.

Research has shown that age-related division of labor is associated with changes in activity rhythms; young adult bees perform hive tasks with no daily rhythms, whereas older bees forage with strong daily rhythms. Toma et al. (2000) reported that this division of labor is also associated with differences in both circadian rhythms and mRNA of period, a gene well known for its role in circadian rhythms. The level of period mRNA in the brain oscillated in bees of all ages, but was significantly higher at all times in foragers. Elevated period mRNA levels cannot be attributed exclusively to aging, because bees induced to forage precociously because of a change in social environment had levels similar to normal age foragers. These results extend the regulation of a "clock gene" to a social context and suggest that there are connections at the molecular level between division of labor and chronobiology in social insects.

Division of labor is highlighted by adult bees making a transition at two to three weeks of age from working in the hive to foraging for nectar and pollen outside. This behavioral development involves acquisition of new tasks that may require advanced learning capabilities. Because acetylcholinesterase (AChE) hydrolyzes acetycholine, a major neurotransmitter associated with learning in the insect brain, Shapira et al. (2001) searched for changes in AChE expression in the brain during bee behavioral development. Biochemical aspects of the AChE protein were similar in foragers and "nurse" bees that work in the hive tending brood. However, catalytic AChE activity was significantly lower in foragers. Cloning of bee AChE cDNA enabled mRNA analysis, which demonstrated that the forager-related decrease in AChE activity was associated with decreased AChE mRNA levels. This was particularly apparent in the mushroom bodies, a brain region known to be involved with olfactory and visual learning and memory. In addition, treatment with the AChE-inhibitor metrifonate improved performance in an olfactory-learning assay. These findings demonstrate long-term, naturally occurring developmental downregulation of *AChE* gene expression in the bee brain, and suggest that this genomic plasticity can contribute to facilitated learning capabilities in forager bees.

Division of labor has been claimed to benefit fitness. In honey bees, the adult work force may be viewed as divided between non-foraging hive bees that rear brood and maintain the nest, and foragers that collect food outside the nest. Honey bee brood pheromone is a larval pheromone that serves as an excellent empirical tool to manipulate foraging behaviors and thus division of labor in the honey bee. Sagili et al. (2011) used two different doses of brood pheromone to alter the foraging stimulus environment, thus changing demographics of colony division of labor, to demonstrate how division of labor associated with brood rearing affects colony growth rate. They examined the effects of these different doses of brood pheromone on individual foraging ontogeny and specialization, colony level foraging behavior and individual glandular protein synthesis. Low brood pheromone treatment colonies exhibited significantly higher foraging population, decreased age of first foraging and greater foraging effort, resulting in greater colony growth compared to other treatments. This study demonstrates how division of labor associated with brood rearing affects honey bee colony growth rate, a token of fitness.

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World Bee Day in Ukraine

The UN created World Bee Day in 2018 to highlight the importance of pollinators and the threats that they face. This year Ukraine's bees and beekeepers face a new kind of threat: a war of aggression waged by the Russian Federation. The war has not only destroyed apiaries, forced tens of thousands of beekeepers to abandon their homes and cut other beekeepers off from their bee yards, but has also disrupted markets, pollination, honey bee research and the planting of nectar-bearing crops. Instead of "celebrating the diversity of bees and beekeeping systems" – the FAO's 2022 Bee Day theme – Ukrainian beekeepers, breeders, scientists, ministry officials and an apitherapist gathered on Zoom for a meetup called "Beekeeping and War: Challenges and Ways to Overcome Them." The event was organized by the Prokopovych Beekeeping Institute (PBI)[1] and the NGO Foundation of Women Beekeepers (FWB) and was hosted by Leonora Adamchuk, associate professor at National University of Life and Environmental Sciences of Ukraine and cofounder of FWB. First Deputy Minister of the Ministry of Agrarian Policy and Food, Taras Vysotsky, opened the event and assured listeners of his support. Presenters' topics ranged from monitoring war-created toxins, to attempts to keep research going, to advice on war-time apitherapy. All were united by a concern about the war's impact on the livelihoods of Ukraine's estimated 46 thousand officially registered beekeepers, and revenues from the production of honey – some 70,000 tons of which are exported each year. Tanya listened in as an anthropologist who studies the history of breeding and conserving aboriginal honey bee breeds in Ukraine.

The meet-up's first half featured presentations by the director of PBI, the head of Ukraine's Beekeeping Association and beekeepers who had to flee and those who have been able to stay. Volodymyr Postoienko, director of the PBI was blunt in his introductory remarks: "In recent years, we have had to deal with different challenges such as the pandemic and now Russian fascists. They destroy infrastructure, civilians and agrarian livelihoods. Their main goal is to pollute the environment… they destroy our productive resources to cause famine here and in the world." His colleague from the National Academy of Agrarian Sciences, Professor Ostap Zhukorsky, elaborated. Previously he and others had studied the impacts pesticides and herbicides on bees partly in connection with the rise in incidents of mass honey bee die-offs and conflicts they had provoked between farmers and beekeepers. However, missile strikes on industrial and civilian infrastructure have released new kinds of toxins into land, air and water on an entirely different scale. Airborne toxins land on bees. They also enter ground water, are ingested by the bees when they consume plants' nectar and could accumulate in wax, honey and other bee products. Toxins' presence may make bee products unsafe to consume therefore ineligible for export to the European Union, one of Ukraine's largest markets. Professor Zhukorsky stressed the urgency of monitoring the movement of pollutants through the environment and implored audience members and other farmers to provide samples for testing before consuming or selling them.

Other talks outlined the ways the war has affected beekeepers, most of whom have 50 or fewer hives. Volodymyr Stretovych, Head of Ukraine's Beekeeping Association, described how fuel shortages, check points and other military restrictions on mobility have curtailed beekeepers' ability to transport apiaries to nectar flows in areas adjacent to battle zones. Leonora Adamchuk talked about the FWB's activities before the war, including its recruitment of 60 women beekeepers from 18 different administrative regions. She also presented data from her survey of women beekeepers throughout Ukraine about how the war has affected them. Seventeen percent had lost apiaries and 17% had left the country. One of these was Iryna Vasylieva, a beekeeper from the town of Svatove in the Luhansk Region. In her talk, Iryna described how before the invasion she had expanded her apiary to 50 hives, begun developing agrotourism with a grant from the United Nations Development Program and been selected to be part of a network of demonstration farms. However, when fields around her town were mined and bombardment began after February 24, she decided to leave for Denmark. FWB survey data showed that an additional 20% of women beekeepers were forced to leave their homes while 66% of women beekeepers indicated that their business had been affected in a significant way.

While other FWB members remained at home they dramatically reoriented their activities. After a week of "tears and denial," founder of the Power of Nature Apiary in the town of Kremenchuk, Poltava Oblast Maria Moseichuk, established a volunteer group which set up a shelter and cafeteria for internally displaced people. She connected with humani-

[1]The official name is National Scientific Centre "Prokopovych Institute of Beekeeping."

Photo 1. Destroyed apiary in the village of Mospanove in the Kharkiv Region.

During the Russian Invasion

Tanya Richardson & Leonora Adamchuk

tarian networks and helped distribute food and medicines to her shelter and to two orphanages. Like many other beekeepers she has donated honey, money and other bee products to the army. She also teaches displaced children about bees and candle-making and manages her apiary which is located 20 km from her home. Nowadays, however, due to fuel shortages stemming from missile strikes on oil terminals, Maria bikes rather than drives. She wrapped up her presentation jokingly on an optimistic note as she described her efforts to make her apiary organic by creating organic fertilizer: "I think there will be a good harvest thanks to my bees and my compost."

Scientists from different backgrounds – biology, chemistry and agrarian sciences – also play crucial and varied roles in supporting Ukraine's beekeeping industry. The second half of the meet-up featured presentations by specialists from Kharkiv, Kyiv, Odesa, Poltava and Transcarpathia who talked about the challenges of diversifying markets, keeping breeding programs going, monitoring apiaries in a conflict zone and pursuing their research projects. Several presenters spoke about breeding and researching Ukraine's aboriginal honey bee breeds – the Carpathian (*Apis mellifera carnica var. ukrainica carpatica*), the Ukrainian Steppe (*Apis mellifera sossimai*) and the Polissian (*Apis mellifera var. polissica*) – which is one of the key tasks of the PBI. Viktor Papp of the PBI's Carpathian Bee Department explained that Transcarpathian-based honey bee researchers have been able to use isolated mating areas to carry out selection work because missile strikes are infrequent.

Photo 2. Four types of Carpathian honey bees from left to right, top to bottom: Vuchkove, Hoverela, Rakhiv, Sinivir

By contrast, because of military prohibitions on using watercraft on the Dnipro River, Hanna Hrechka and Tetiana Senchuk of the Ukrainian Steppe Bee Department in Hadiach, Poltava, have been unable to continue their selection work because they can't access the isolated mating area on an island in the Dnipro.

Genetic research about Ukrainian Steppe bees has also been disrupted by war because of the closure of Ukraine's airspace. Professor Ihor Kostikov of Kyiv National University and the Prokopovych Institute explained that whereas the genome of Carpathian bees has been fully sequenced, the Ukrainian Steppe bee's has not. Without this sequencing the question of whether it is a distinct subspecies (*Apis mellifera sossimai*) or a population of *the Apis mellifera macedonica* subspecies cannot be fully answered. Professor Kostikov had been about to send the sample abroad for sequencing when the war began. Uncertainty about this bee's taxonomic identity means that some beekeepers – particularly those who import other kinds of bees such as Carniolan or Buckfast bees – can dispute the value of conserving Ukrainian Steppe bees. Nevertheless, Ihor Kostikov responded with an emphatic "yes" to Leonora Adamchuk's question about whether it is important to continue conserving them despite not definitively knowing their identity. Honey bees' extreme polyandry and aerial mating practices mean hybridization happens easily and is difficult for beekeepers to fully control. Kostikov reminded the audience that over the long term, hybridization leads to the loss of the rich diversity in sex alleles of a particular population and eventually their existence as a distinct population. Data from genetic sequencing can help provide additional arguments for conserving Ukrainian Steppe bees and enforcing regulation regarding their use in particular territories. Leonora Adamchuk noted that Polissian bees (*Apis mellifera var. polissica*) have survived only in the Chornobyl Exclusion Zone and have not been studied at all.

Photo 3. Trip to an isolated mating area on an island in the Dnipro River

While Ukrainian and foreign observers are well-informed about the size of Ukrainian honey exports and their contribution to the Ukrainian economy, the significance of the international export of queens to the European Union, Middle East, Central Asia, Russia and Canada is less well-known. Stepan Kerek, head of the Carpathian Department of the PBI, explained that until February 24, Russia was one of the largest export markets for Carpathian queens and bee packages while bees bound for Central Asia have typically transited through Moscow. He reminded the audience that the export of queens and packages from Transcarpathia to Russia began in the 1970s with the development of a queen breeding program and that the region does not produce much honey. The loss of Russian and Central Asian markets has therefore been a shock to the region's 1,036 beekeepers. Stepan argued that it is imperative that the Carpathian breeders undertake a "derussification" of their trade and proposed that Canada could replace Russia. This is not only because Canadian demand for queens and

packages is large, but also because in 2020 Canada approved the import of Ukrainian queens. Ukrainian breeders have had success in exporting queens to Canada and hope that the packages could be approved soon.

Odesan Agrarian University researchers Halyna Skrypka (in Odesa) and Olena Ievtushenko (in Kharkiv) both had their work interrupted but have nevertheless continued to gather data and envision future research. In spite of limitations that constant bombardment and the occupation of part of Kharkiv Region imposed on her research, Olena presented data about the scale of destruction and raised questions for monitoring and research.[2] Because up to 30% of Ukrainian beekeepers don't register their apiaries, it is difficult to provide precise data about the loss of hives; at the same time beekeepers who lost apiaries "may not be emotionally or practically able to get in contact." While showing a picture of destroyed hives, Olena explained that in Kharkiv, 76.45% of apiaries suffered losses, a figure that included colonies, equipment and storage facilities. Olena proposed that once the war is over and the territory de-occupied, researchers should focus on two issues: first, compare hives that are managed by a beekeeper with those that have been abandoned; second, compare bee colonies that have experience shock waves from explosions with those who have not.

Olena's Odesan colleague Halyna, who had no access to her lab for two months, spoke about "the everyday life of a scientist during war" and how she sought to "do her part." When her lab closed she decided to continue her investigations at home using a 1935 microscope inherited from her great-grandmother who had taught at Odesa's Medical University. A package of honey sent by a beekeeper in Ternopil oblast just prior to the invasion became her focus. Although she was unable to perform a full analysis of the samples, she was able to identify pollen types in the honey with the help of a pollen atlas. Her lab has recently reopened but resources are extremely limited. Nevertheless, she said, "We should do the work that we love, that inspires us and that calms us down. Scientists should do their research; science is the future and the future depends on us."

Apitherapist and psychologist Svitlana Volynets addressed her fellow beekeepers as human beings with bodies and souls in a presentation about the healing properties of propolis and other bee products. She listed the types of emotions that accompany war-induced stress – alarm, shame and sorrow – and the biological and psychological effects of living with extreme stress for more than 28 days. She reminded listeners that this kind of stress elevates cortisol levels which removes calcium from bones, undercuts protein synthesis, affects the release of insulin, undermines a person's sense of their own basic need to sleep and eat and disrupts the release of hormones that enable a person to feel joy. Svitlana urged her colleagues to consume propolis-based products to reduce depression, and royal jelly – which is rich in B6, B12, and folic acid – to lower cortisol levels. She told them to practice another tried and true form of Ukrainian psychotherapy – singing. "By looking after yourselves," she said, "you will be better equipped to respond to unpredictable situations, better able to help others in need and will avoid the feeling of victimhood."

Attendees filled the Zoom chat with greetings, suggestions, words of support and expressions of gratitude to the organizers for creating an opportunity to gather. The 2022 FOA World Bee Day presentation which some Ukrainians joined afterwards celebrated the diversity of bees and beekeeping systems with beautiful videos and slide presentations from around the world. In Ukraine, World Bee Day enabled Ukrainian beekeepers and researchers to gather together to affirm their ability to survive, resolve problems, envision a future and defy the Russian military's campaign to destroy them and their land. Over and over again participants addressed each other with versions of Leonora Adamchuk's words: "We are on our land; we will be victorious."

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[2]Olena heads the bee diseases sector of her university's Experimental and Clinical Veterinary Medicine Research Centre.

Photo 4. Forum of the Federation of Women Beekeepers Fall 2021

Measuring the Mites:

The Mite-A-Thon is a Conversation that is Keeping Colonies Healthier and Overwintering Stronger

Savannah Christiansen, Pollinator Partnership &
Anne Marie Fauvel, Bee Informed Partnership &
Nathalie Steinhauer, Bee Informed Partnership

Bee Informed Partnership (BIP) is fond of collaborating with beekeepers, organizations and institutions. These collaborations are a kind of superpower, a great way to come up with ideas, support and implement them always with the goal of generating more impact. BIP's collaboration with the Pollinator Partnership is one such example.

Pollinator Partnership is the largest organization dedicated exclusively to the conservation, education and research of pollinating animals and their habitats. Founded in 1997, their team of staff scientists has conducted numerous research studies on key questions and concerns in land management, agriculture and wildland conservation. With this science-based understanding at the forefront of their work, Pollinator Partnership has been cognizant of threats facing honey bees for many years including the impacts of the *Varroa destructor* mite on colony health. In order to spread awareness about monitoring for the *Varroa* mite, Pollinator Partnership got together with the MiteCheck team, including the Bee Informed Partnership, University of Maryland, University of Minnesota and Michigan State University to launch the North American Mite-A-Thon beginning in 2017. The group worked together to identify key priorities, gaps in knowledge and logistics for a continent-wide education, awareness and data collection campaign around monitoring hives for mite levels.

Members of the Chester County Beekeepers Association begin the testing process to monitor for *Varroa* mites in their honey bee colonies. Photo credit: Chester County Beekeepers Association

The Mite-a-thon is now an established, tri-national citizen science effort between Canada, the United States and Mexico to collect *Varroa destructor* infestation data in honey bee colonies. During two weeks in the Spring and another two in the Fall, beekeepers are encouraged to test for the number of mites in their hives using two common methods for monitoring (alcohol wash or powdered sugar roll) and upload that data into a website and app called Mitecheck to be compiled and analyzed. While Mite-A-Thon is not meant to be a rigorous scientific study, this citizen science project is meant to educate beekeepers, particularly non-commercial beekeepers, about effective monitoring methods for *Varroa* as part of overall colony health. Through participation, beekeepers also learn about different management practices from one of the many treatments available to no treatment at all. That said, Mite-A-Thon doesn't take any one point-of-view on management practices, that is up to each individual beekeeper.

Now in its sixth year, the Mite-A-Thon has reached an estimated 2,570 unique participants and tested 1,018 colonies since its inception in 2017. Over the years, Mite-a-Thon has seen more beekeepers answering the question about management practices, which may have contributed to participants being more aware about treatment methods. As for longer-term survival, the level of *Varroa destructor* infestation at the end of the season is a pretty good indicator of overwintering losses. Though it is just one of the factors that can influence overwintering survival, it is really important to help beekeepers have an idea of what lies ahead based on their late season infestation levels. That said, each year has seen a high percentage of new participants, revealing that, beekeepers gain new knowledge and skills they can use towards maintaining colony health. Mite-A-Thon has also provided a platform for beekeeping associations to engage new members in their organizations and reconnect with long-time members to re-familiarize them with proper *Varroa* monitoring techniques.

This year the Mite-A-Thon is continuing with another two sessions for *Varroa* monitoring. One took place in the Spring, from April 30 – May 15, 2022 and the second will take place in the Fall, from August 13 – August 28, 2022. This August, all beekeepers in North America are encouraged to participate. You can do so by using either the powdered sugar roll or alcohol wash method to record the number of mites in each colony you test and upload those results to **www.mitecheck.com**. The more participants,

the more data available for Pollinator Partnership and its partners to use in their work towards the protection of honey bees, along with growing a stronger network for beekeepers to connect and share information.

The Pollinator Partnership and Bee Informed Partnership invite YOU to collaborate and participate in the 2022 Mite-A-Thon this month. On your mark, get set, mitecheck!

The Chester County Beekeepers Association, a group which helped propel Pennsylvania into the state with most participants in 2020, poses with their hives after the Mite-A-Thon.
Photo credit: Chester County Beekeepers Association

The Times They Are A Changing

John Miller

A trend is underway in manufacturing and transportation.

Seems we are convulsed with trend changes, abrupt and sometimes shocking.

This one is getting underway and it will impact a lot of merchandise.

Events like California's highest fuel taxes in the nation, coupled with $7.00/gallon diesel has food manufacturers, timber truckers, cattle haulers and beekeepers thinking deeply about freight.

Water. We haul a lot of water in manufactured products. Watch for big changes in lotions, conditioners and shampoos. The first ingredient in all three items is usually water.

So too foaming hand soap, spray cleaners, mouth wash – we have a lot of water in the house.

Are you fond of ham or turkey? Food manufacturers have perhaps perfected the injection of water [and salt] into turkey and ham, and packaging both in leakproof plastic. It's a marvel: Selling water for $6/pound.

Potting soil. Those bags are not quite mud; but they are far from dry. A semi hauls 4,000 bags of potting soil each weighing 12 pounds. How many more bags could be hauled if those bags weighed 10 pounds because the pot soil was packed dry? The savings are immediate and measurable.

Juice. Fresh Florida orange juice is a lot of water, sugars, flavor. Delicious. By the time the watery juice arrives in Calgary – a ton of fuel [and refrigeration] are used. Milk of all kinds: oat, almond, soy, cow, goat; all those products are… loaded with water.

To be clear, I'm not talking about the use of water in the creation of the described products. Loudmouths declaring the uninhabitable condition of our planet ten minutes from now [or maybe ten minutes ago? I've lost track] have their own place. This is about how the product gets to the consumer.

Ah, the consumer. The fickle consumer. Manufacturers expend fortunes attempting to figure out the consumer, who will embrace dried fruits, but reject dried milk. There is a reason 95+% of juice is not dehydrated. Consumers will embrace concentrated laundry and dish detergent, but shun a bottle of shampoo that trumpets 'Use Less – Great Value – Add Water!'.

If a product is not convenient, even if it contains less water, if the convenience collides with function – the product is headed to discounted clearance death. Is that 12-pound bag of pot soil a value because it is heavy, and awkward, and us gardeners expect awkward and heavy?

What kind of motivation will change consumer behavior? Define consumer values. Everyone has tried. A 12-oz. can of Coke is water, sugar and flavorings. I buy the eight ounce cans because they are healthier. Will the V-8 drinking geezer spill a ¼ cup of powder into a glass of cold water?

Whiskey drinkers add water or ice or both to their tumbler. Whiskey is already mostly water.

[Could ANYONE talk Godlin into purchasing dehydrated/rehydrated Jack?]

Will consumers adopt a more virtuous view of purchases? I smile at the fiercely loyal Fiji bottled water drinkers who haven't really thought about where, or how Fiji water gets here.

It's far, far away. Same goes for San Pellegrino.

Is the soon-to-arrive bottle of concentrated hand lotion, with these instructions on the label:

'Add six ounces of water prior to use' going to work? Will consumers buy Florida fresh orange juice; and 'Add three cans of water prior to use' – in Calgary?

What will the packaging look like? Can a gallon of concentrated juice be sold with instructions to 'Add three cans of water, mix thoroughly before serving'? Can I humble brag after a deliberate purchase of dehydrated shaving powder? Is that convenient? Does it even exist? Will it further dry my skin?

Will consumers buy a ham that is only 15% water-injected instead of 25% water-injected because consumers know it costs a lot to deliver goods by truck – and EVERYTHING is delivered by truck.

Consumers are not yet deeply thinking about packaging and freight efficiency. An early indicator may be less frequent shopping trips. Then comes the shock and awe of price inflation – a direct line from fuel cost to product cost. The long term awareness of needless water hauling will come from consumer interaction with food manufacturers. The motivation will come from the consumer. It must be convenient.


Garett Slater

The winner of the 2022 award for PhD candidates is *Garett Slater* from the Department of Entomology at Purdue University under Dr. Brock Harpur. His application was entitled, *Using genomics to predict drone quality: Why are there so many 'dud' male honey bees.* His research is firmly rooted in a deep understanding of drone genetics and reproductive quality with the ultimate goal of improving queen mating success and colony health. Garett's productivity and commitment to scientific communication is exceptional.

The winner of the 2022 award for Masters work is *Brooke Lawrence*, a Masters student in the Department of Entomology at Pennsylvania State University under Dr. Margarita López-Uribe. Her thesis research is entitled, *The role of beekeeping management systems on microbes, pathogens, and immunity in honey bees.* Her integrative research shows the importance of understanding the multifaceted impacts of management strategies on bee health and overall the continued importance of keeping *varroa* mites in control. Brooke's work is impressive and we look forward to seeing where her career takes her.


Brooke Lawrence


Peter Fowler

The winner of the 2022 Extension Activities Award is *PhD student Peter Fowler* of Michigan State University, who is advised by Dr. Meghan Milbrath. He received the $1,000 award for his proposal entitled, *Diagnostics training for veterinarians working with honey bees.* Funding will fill a much needed gap and support development of training for veterinary professionals to conduct diagnostic screening assays. This effort may also lead to larger funding, and so this award serves as a seed grant in this capacity.

American Association of Professional Apiculturists (AAPA) Announces Winners

Priyadarshini Basu

Thinking Outside the Bee Box:
Unusual Ways to Turn a Profit

Stephen Bishop

Life is full of little ironies. Last year I was on a podcast—and get this, the name of the podcast was *Farm4Profit*. They needed someone to do a segment on beekeeping, and somehow they found me. Apparently, they didn't know I have a blog called *The Misfit Farmer*, where I dispense questionable farming advice and mostly enumerate the many ways I've lost money farming, beekeeping being one of them. Instead, because I write for a beekeeping magazine, they thought I was a beekeeping expert, obviously having never read any of my articles, which would have quickly dispelled them of that belief. The point here, though, is I feel like I short-changed the nice guys at *Farm4Profit* (when they're not interviewing me, the podcast is very high-quality and I recommend it for anyone interested in agriculture). Admittedly, I was nervous, having never been on a podcast before, so I'd like to make it up to them by providing some surefire ways to turn a profit.

The great news is I'm often too busy chasing swarms over the horizon to fool with paperwork, so I haven't filed for patents on any of these lucrative ideas yet. That means you're free to make millions off them without worrying about patent infringement. In fact, just a nice hand-written note and 10% royalty on sales for perpetuity is all I ask. So without further ado, I present your path to future fame and fortune (don't everyone rush to apply for Shark Tank all at once).

Biodegradable Diapers with a Built-in Wildflower Mix. Just let your baby add fertilizer, then plant, water, and wala! In a few months you'll have a little tuft of wildflowers for your favorite vase.

Organic Clay-Doh. Put red clay in a little plastic cup and market it as Organic Clay-Doh, an all-natural alternative to Play-Doh. The only downside I see is a wall of little red clay handprints (can't be worse than a floor with red clay bootprints). New Shark Tank Idea: a cleaner that removes red clay bootprints effectively enough that your wife doesn't threaten to put new locks on the door and banish you to the barn.

Stingers Home Security Company. Place mean bee hives at strategically-placed positions around houses to deter home invaders. Possible slogan for company: "Who needs an alarm when you have alarm pheromone?"

Whirlpool Washer/Extractor Combo. For a piece of equipment that only gets used a couple of times a year, honey extractors are big and take up a lot of space. A honey extractor that doubles as a washing machine the rest of the year would sell like hotcakes to hobby beekeepers.

Beemorang. A hive tool shaped like a boomerang. When you accidentally sling your hive tool into the atmosphere because a bee just performed a torture technique by inserting its stinger under your fingernail, the hive tool will return to you. When using the beemorang, it's recommended that you wear a veil/helmet combo to prevent accidental concussions.

The Lil' Loader Seat. If you're tired of toting your offspring around the farm or pushing them in the stroller, the Lil' Loader Seat, a baby car seat for your tractor's front-end-loader, is for you.

Kudzu Cologne. Ever traipsed through a kudzu patch beside a pond while searching for a jon boat now hidden by vegetation? Well, I have. And I can tell you that kudzu has a pleasant aroma. Plus, kudzu would be a very easy crop to grow.

Cow Obedience College. Tired of having to reimburse your neighbors for the shrubbery your fugitive cows ate? That's not a problem when your cows have graduated from Cow Obedience College. A cow with an accredited degree from Cow Obedience College will learn to respect fences, no matter how dilapidated, and never chew cud with their mouth open.

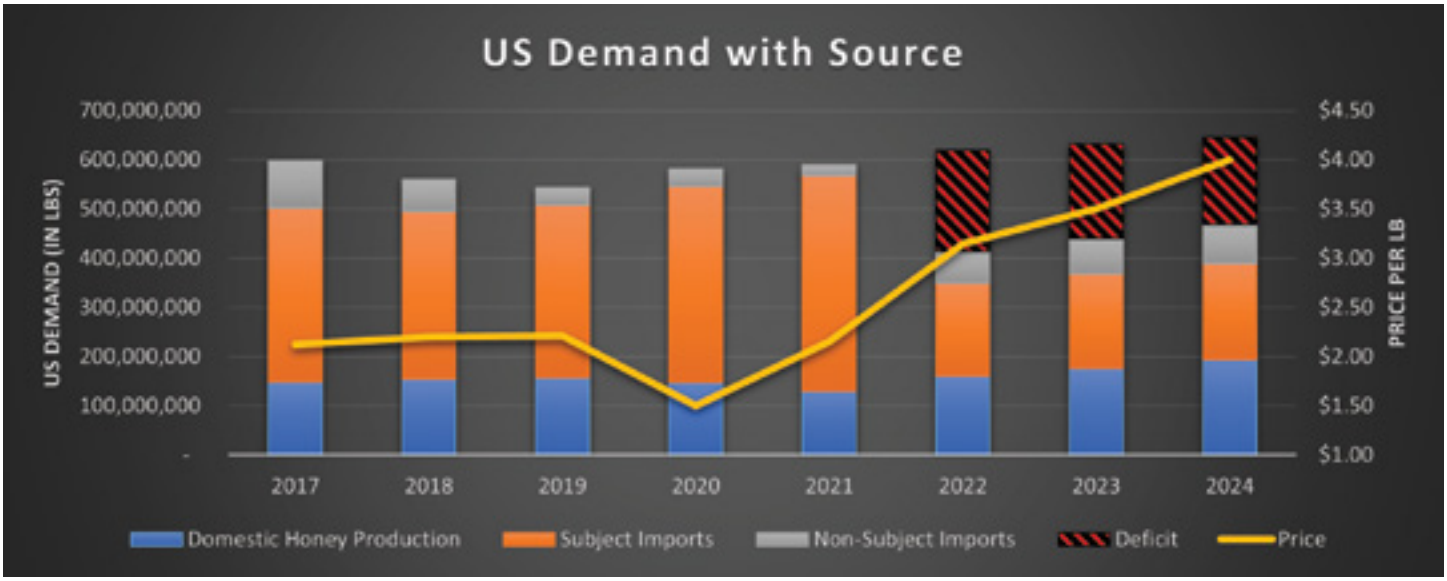
Yoga with bees. I'm not sure if you know this, but there's a new trend sweeping America in which full grown adults pay to do the downward dog with goats. But if a person really wants to practice controlled breathing, a bee yard would be the proper place to do it. Let's be honest, bees value slow deliberate movements more than goats.

Anyway, the above are all surefire ways to turn a profit farming. Or, at least, in theory they should. That said, both farming and beekeeping are a lot easier to do in theory than in practice.

Stephen Bishop is a beekeeper and humor writer, specializing in agricultural antics. You can read more of his work at **misfitfarmer.com** *or follow him on Twitter @themisfitfarmer.*

Bulk Raw Honey Prices Analyst Project all time Highs

Brady Doran, Mann Lake



For the past few years, U.S. honey prices have been retracting. Honey imported from a variety of sources has been depressing the prices of U.S. honey, but change is occurring. This season is slated to bring the highest honey price on record.

The U.S. demand for raw honey had increased from 524 million pounds to 534 million pounds between 2018 and 2020. This most likely stems from the perceived health benefits of consuming honey and concerns over artificial sweeteners.

During that same time, domestic raw honey production dropped from 154 million pounds to 147 million pounds, down from historical productions of over 230 million pounds.

Imports from Argentina, Brazil, India, Ukraine and Vietnam rose in U.S. market share from 60.8% to 68.4% between 2018 and 2020. Meanwhile, domestic U.S. production decreased in market share from 27.5% to 25.4%.

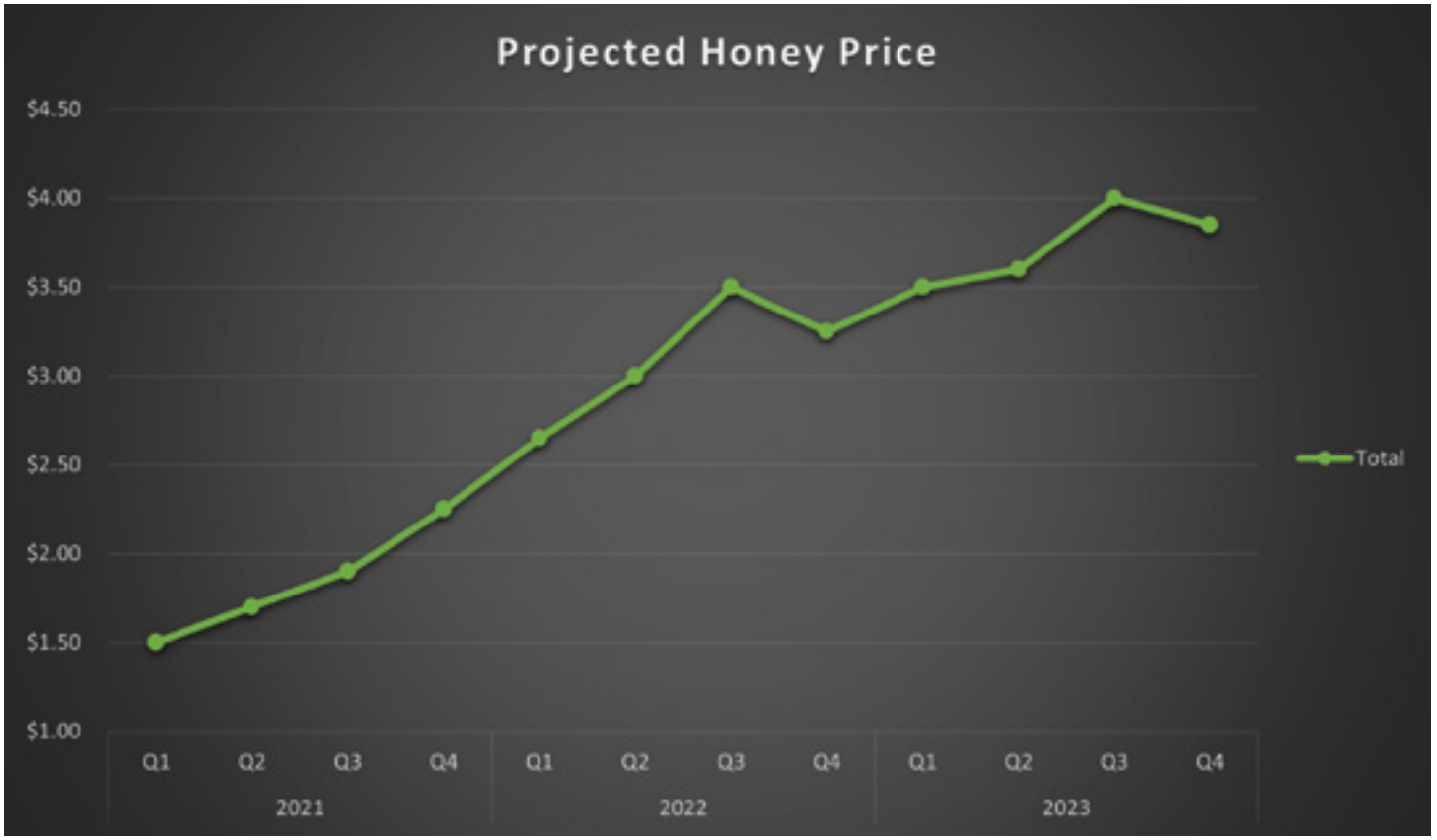
In the overall honey market, a majority of U.S. producers and importers reported lower market prices, more importing from these countries, more blending of U.S. honey with lower cost imported honey and higher rates of honey fraud (illegally labeled honey with no country of origin and honey diluted with fake honey and/or sugars).

Between 2018 and 2020, domestic prices for raw honey decreased by up to 30.5%, with the lightest color of honey being the most affected. This grade of honey accounts for more than half of all U.S. production. Prices for imports of raw honey from subject countries saw even greater decreases, up to 54%.

To combat this, in April of 2021, the American Honey Producers Association (AHPA) and the Sioux Honey Association (SHA) filed petitions with the Department of Commerce alleging that the domestic industry for raw honey production is being materially harmed by less than fair value (LTFV) imports of raw honey from Argentina, Brazil, India, Ukraine and Vietnam (subject countries). However, as a result of the current war in Ukraine, the petition for anti-dumping duties against them has been dropped. Honey production is still likely to be greatly disrupted and the U.S. cannot expect to import honey in any significant quantities from Ukraine.

An investigation like this is not new in the world of honey. In September of 2000, a petition was filed similar to this most recent filing, stating that honey from Argentina and China was being imported into the United States at LTFV. The DOC ended up ruling in favor of the U.S. and instituted anti-dumping measures against both countries. However, in 2012, the anti-dumping orders lapsed for Argentina, but remained in place for China and remain in place to this day.

In November of 2021, the DOC ruled in favor of the AHPA and SHA, stating that the subject countries were dumping honey into the U.S. market at LTFV and harming the domestic industry. As a result of this decision, preliminary duties were applied to all major exporters in all five subject countries:



- Argentina – 8 to 49%
- Brazil – 8 to 30%
- Vietnam – 411 to 414%
- India – 6 to 7%

We have already seen the effect these new tariffs materialize in the level of imports from these countries. Imports from all these countries are down dramatically, up to 94% in some cases.

Current trends imply a supply deficit of nearly 200 million pounds of honey for each of the next three years.

Applying simple economic principles would put a price floor of $3.00/lb for this upcoming season with $4.05/lb or greater within scope for regional and varietal honey.

To add another layer, consider the real cost of importing honey.

Indexed shipping rates from East Asia to the west coast of the United States and from northern Europe to the east coast of the United States have nearly tripled year over year.

This pushes the cost just to import honey north of $0.60 per pound for transportation only. Coupled with the increased duties from counties subject to the DOC ruling on anti-dumping, prices of imported honey will be pushed into the $3.00 per pound range and above.

With nearly 70% of U.S. imports being subject to tariffs and all imports being subject to increased transportation costs, $3 honey is the inevitable outcome in the short term with even higher prices on the way.

BEEing Diverse: Inspiring Leaders in Beekeeping

Mark Your Calendars for September 30 - October 1, 2022

The Return Of Bee Culture's *Annual Event*

We have an impressive lineup of speakers. The meeting will be held in our Bee Culture Conference Room. Watch these pages and our web page for more details as we firm up the details. Register now at www.Store.BeeCulture.com.

Susan Cobey: Internationally known Founder of New World Carniolan program

Dorothy Pelanda: Director of the Ohio Department of Agriculture

Jackie Park Burris: Jackie Park-Burris Queens, Inc.

Barbara Bloetscher: Ohio Department of Agriculture State Entomologist/ Apiarist

Julianne Grose: Associate Professor in the Department of Microbiology and Molecular Biology at BYU

Tammy Horn Potter: Kentucky State Apiarist, author of multiple books

Nina Bagley: Urban Master Beekeeper

Geraldine Wright: Hope Professor of Entomology in the Department of Zoology at University of Oxford, UK

Kim Skyrm: Chief Inspector of the Massachusetts Department of Agricultural Resources.

Tracy Farone: Professor of Biology at Grove City College in Pennsylvania

Maggie Lamothe Boudreau: Commercial Canadian Beekeeper, owner of *Rayons de Miel,* a 350 colony operation raising 4000 Queens a year.

Joan Gunter: Past president of ABF, Commercial Beekeeper

Anne Marie Fauvel: Bee Informed Partnership (BIP)

She is speaking to represent the women of BIP who are all pictured.

We would like to apologize to Kim Skyrm. In the last issue, we wrote that he was the Chief Inspector of Maine Department of Agriculture. This is not the case. Since this is the third time trying to put on this event, most of our information gets copied from the previous year. And while we look through everything, we did miss this important detail.

All The Buzzz in...

Hello Friends,

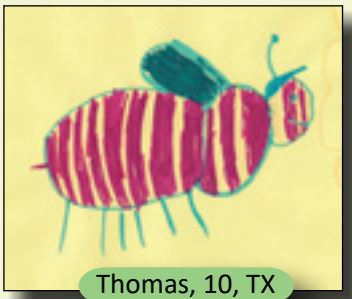
Enjoy the last days of summer!

Bee B.Queen

Bee B. Queen Challenge

Send me a queen bee poem or song.

Lily, 4, TX



Thomas, 10, TX

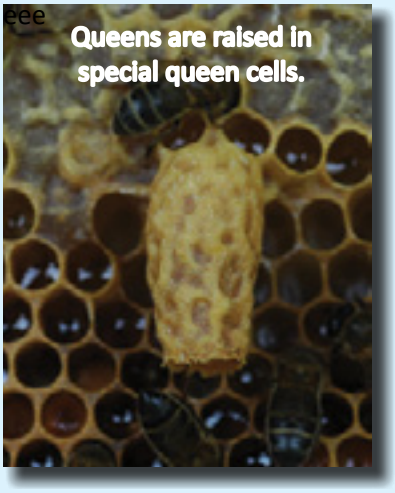
Here Comes the Queen

The queen bee is an important part of the hive. She lays all the eggs and produces a scent (pheromone) that keeps worker bees from laying eggs and keeps the hive happy.

If the queen bee dies or if the hive is too crowded, the worker bees make a new queen.

Any fertilized egg can become a queen.

A queen bee larva is only fed royal jelly. Royal jelly comes from a gland in the heads of young worker bees. It is very nutritious. Worker larva are also fed royal jelly for the first few days. After that they are fed bee bread which is a mixture of nectar and pollen.



Queens are raised in special queen cells.

If a hive is crowded, the bees will make another queen. The old queen will leave the hive with about half the bees to make a new home.

The queen is the mother of the bees in the beehive.

A group of worker bees surround the queen. They feed and care for her.

Queens lay an average of about 1000 – 1200 eggs a day. In the summer she can sometimes lay up to 2,000 a day. A queen can lay about 175,000-200,000 eggs a year.

A queen bee lives about 2-5 years. Figure out about how many eggs the queen could lay in her lifetime.

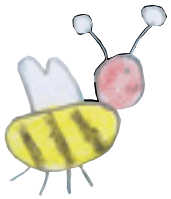
Can you find the queen in each photo?

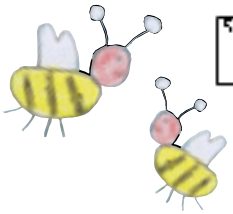
1 queen bee, 2 abdomen, 3 brood, 5 queen cell, 6 royal jelly, 7 lay eggs, 8 pheromone

Bee kid's corner

Produced by Kim Lehman
www.kimlehman.com
www.beeculture.com
August 2022

Queenly Crossword





ACROSS
3. Another name for baby bees
5. Place where the queen develops (two words)
6. Food produced by a gland in the worker bee that helps to develop a larva into a queen bee. (two words)
8. A queen develops in about _____ days.

See a queen bee laying an egg.
https://tinyurl.com/3365svdc

DOWN
1. The only bee in the hive that lays fertile eggs. (two words)
2. The queen bee has a larger ____than the worker bees.
4. A chemical produced by the bees that is a scent used in communication.
7. One of the main jobs of the queen is to ___ (two words)

Beecome a Bee Buddy

Send two self-addressed stamped envelopes and the following information to: Bee Buddies, PO Box 117, Smithville, TX 78957.

Name
Address
Age
Birthday Month
E-mail (optional)

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

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

Queen Song

(Tune: Row, Row, Row Your Boat)
Lay, lay, lay an egg
One inside each cell.
When the queen is laying eggs
Everything is well.

Beekeeping Royalty

Meet Lucy Winn the 2022 American Honey Queen!

New(ish) Beekeeper Column

Off the Wahl Beekeeping

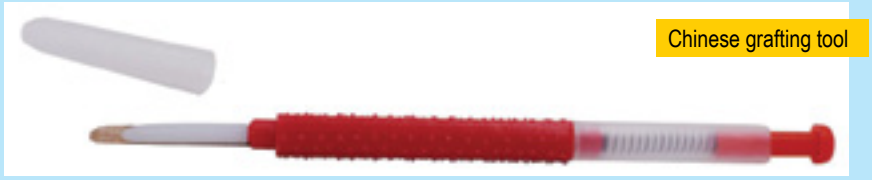
QUEEN REARING

Richard Wahl

In the April 2022 issue, I spoke about increasing your hive count and made the assumption that any splits with eggs and brood would result in a new queen being developed by the split off nuc. Left to their own devices this is usually what the bees do as long as there are adequate recently hatched eggs (larva) in the split from which a new queen cell and queen can be made. Often bees in the newly split off nuc will make more than one queen cell and if left unattended the first to emerge will open and destroy any other queen cells before the others have a chance to emerge.

A newly emerged queen on a frame with pollen

Bees in a queenless nuc are eager to get a new queen and may not always choose the youngest hatched larva from which to make a queen cell often dependent on the room they have to make a cell around the chosen larva or egg. After three days as an egg there are only about three more days as a larva during which a viable queen cell can be made. As a result the first queen to emerge may not be the best queen that the bees can produce. If a larva that is a day or two older is chosen for a queen cell it may not have had as much time being fed royal jelly and therefore not be the strongest and most viable queen the nuc could produce. The earliest hatched larva that had an ample royal jelly diet from the time of its hatching will need a day or two more before being capped and also for its subsequent emergence. It would most likely be killed by the later larva developed queen that emerged a day or two sooner. If the nuc is left alone the beekeeper is none the wiser and must accept whatever queen cell the bees chose to give the opportunity to emerge first. But what can the beekeeper do if a few extra queens are desired beyond those that will be staying with the newly split off nuc? Just as there are several ways to increase your hive count using the natural tendencies of bees to want to continue as a viable organism, additional queens can also be gained by using several different techniques to encourage the bees to make more than one queen.



Chinese grafting tool

Queen Grafting

Four or five years ago I tried queen grafting. A day prior to the actual graft I removed three brood frames from hives and placed them in a five frame nuc box sitting over an open screened bottom box. The fourth frame had nectar and pollen stores on it while the fifth middle frame was empty and would later be replaced with the queen rearing frame. That screened bottom box held a soaking wet sponge to provide a water source while the nuc bees were held captive overnight. It also provided good ventilation on a hot June day. I felt this overnight stay without a queen would encourage the enclosed brood caring bees to produce more royal jelly in support of the queen cells that I would introduce the next day. On the very next warm June day I set up a spot near my hives and proceeded to move twenty small larvae into queen cups which were then moved into a queen rearing frame. After choosing two frames loaded with eggs and small larva from adjacent hives, I used what is called a Chinese grafting tool to move the very small larva into plastic queen cups. The grafting tool is a small pen like device that has a flexible thin plastic tip which slides down the side of a cell and under the chosen larva. Once the larva is on the tip and extracted from the cell it is placed on the bottom of a queen cup where a spring-loaded plunger, activated like the top of an ink pen, pushes the larva onto the bottom of the queen cup. Slipping the end of a Chinese grafting tool under the smallest possible larva and retrieving it without rolling the larva in the royal jelly is a bit of a challenge and takes a sharp eye.

If the larva is rolled it will normally die as its breathing orifice is only on one side at this stage. Normally the smallest larva are close to unhatched eggs that will soon hatch and become larva. I kept a warm damp towel close by to cover larva already placed in cups so they would not dry out as I am sure I was a bit slow during my first time tries. When I had my twenty queen cup frame ready I replaced it with the empty frame in the nuc and also opened the nuc so the over-night enclosed bees could now come and go. I also provided this queen rearing nuc with sugar syrup as nectar sources can vary during the Summers here in SE Michigan. It takes sixteen days for an egg that

was designated to become a queen to mature and emerge as a queen. Paying close attention to the calendar I knew my selected larvae had spent three days as eggs and were already four or five days old when chosen to be moved to the queen cups removing this time from the sixteen-day period. Allowing for an additional eleven or twelve days before emergence, I made sure to watch the calendar and separate individual queen cells to their own nucs on the tenth day after the small larva collection to be sure I moved the collective queen cells before any could emerge and destroy the others. There is a critical queen pupa development period from ten to thirteen days after the egg is laid (six to nine days after very small larva selection) where care must be taken to not jostle the queen cell. Doing so could harm the developing queen. To my pleasant surprise I was rewarded with 10 queen cells that were moved to their own individual nucs just before emerging. I was pleased with a 50% success rate on my first try and sold several queens as well as a few nucs during that first trial Summer.

Frame with ten queen cells and comb started in empty space.

As a small hobby beekeeper I am not after a large increase in my hive population, but did use the same method to try for ten new queens the following year. I had a lower success rate resulting in three queen cells and three subsequent queens out of ten grafts. I feel this was attributed to an earlier in the season attempt when outside temperatures were a lot cooler. That may have resulted in the moved larva not being kept warm enough through the process. If I try this again in the future (earlier in the season on a cool day) I will move inside a warm room or inside a warmed truck when grafting. Since that first attempt I have begun a different method of raising queens which is not dependent on outside temperature, water availability, warm towel moisture or seasonal variability.

Queens from Splits

Hives that come through Winter with a strong population are good candidates for a split. In addition to adding to the beekeeper's hive count this is also conducive to the reduction in the possibility that the hive will swarm. The beekeeper can take advantage of their bee's natural desire to have a queen and encourage the making of more than one queen in each split. The first key requirement is to move several frames covered in eggs, larva and capped brood to the split off nuc or hive. These are the frames with the most newly hatched and worker/nurse bees that will make and provide an ample supply of royal jelly for any anticipated queen cells that will be made. Choose at least two frames from your best traits' hive to assist the bees in choosing their queen cells. Find at least two cells on each frame with the smallest larva and using a flat end screwdriver scrap away the bottom edge of the comb of that cell and two or three cells below it. This makes room for the bees to make a larger queen cell in those spots although destroying the nearby larva. Choose cells that are a few inches apart so that the cells can later be covered by a push in cage. With a bit of luck the bees will make several queen cells on different frames that can be moved into separate nucs.

Separate queen cells on a frame being drawn out.

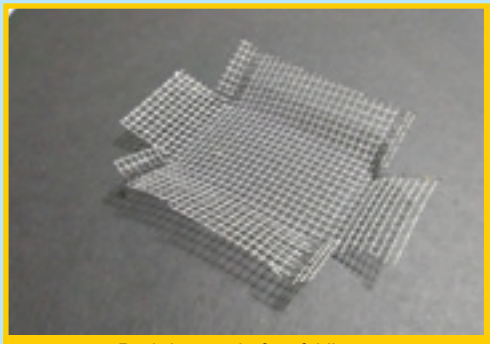
To keep the bees from making adjacently joined queen cells with two adjacent larva, I also carefully remove the larva on both the left and right side of the chosen cell. Once these frames are placed in a nuc it becomes critical to watch the calendar and at about ten or eleven days after larvae cell scratching inspect the frames and use push in cages to keep emerging queens separated. I also like to check the scratched larva locations in two or three days to see that new queen cells are being made. Often by this time cells are capped as queen cell capping occurs around five and a half days after the egg was laid. If the bees establish queen cells on more than one frame, one of those frames can be moved to another nuc with additional brood and pollen/nectar frames to continue the process in an additional nuc. I normally scrape two locations for queen cells on two different frames which ultimately allows for the possibility of four queens getting started from one nuc.

Gaining Those Extra Queens

Push in cages can be inserted at any point after the queen cells are capped. To get attendant bees to leave the area of the queen cell I find that just blowing on the queen cell area causes the bees to leave so that the cage does not also capture attendant bees; although this may not be a big concern if a few bees are also under the cage. It is easier to spot an open queen cell and emerged queen if there are no other bees under the cage. I like to wait as long as possible to place the cage since the fastidious bees will clean up the outside area where cells were damaged by the push-in cage.

The cage could then fall away from the frame when trying to remove it. To avoid this, I sandwich the cage between two frames and remove those two frames at the same time keeping them together to sandwich the caged queen cells. Laying the frames on a horizontal surface, the top sandwiching frame can be lifted from the cages on the bottom frame and inspected for emerged queens.

Push-in cages over queen cells.



Push-in cage before folding.

Push-in queen cell cage.

Use care in this step since if the cage or cages stay attached to the top sandwiching frame and new queens have hatched, they can move very quickly and be hard to catch. Often one queen will have emerged while the other has not, and the newly emerged queen can be moved or the remaining queen cell can be moved to another nuc. I like to leave the first hatched queen with the starter nuc and remove the remaining queen cell frame to a second nuc while adding a brood frame or two and pollen/nectar frames from an established hive to this new nuc. I have successfully gotten four queens started from one nuc using this method. Two frames, each with two scratched cells are separated into two nucs. Once queen cells appear and each first queen emerges the remaining unemerged cell frame is then moved to its own nuc.

Making Push-in Queen Cages

The process of making your own queen cages is not that difficult. I had made my own screened bottom boards, so I had a few remnants of ⅛ inch hardware cloth left over. ⅛ inch hardware cloth is nothing more than a ⅛ inch wire mesh and can be found in rolls at most hardware or big box stores. Using a wire snips, I start with a piece that is cut to a 3½ by five inch rectangle. On the long side I make a one inch cut that is ½ inch in from the end on each of the four corners. On the short side I make a one inch cut that is one inch in from each side on all four corners. Discard the one inch by ½ inch piece from each corner. This allows for a ½ inch bend-in overlap area on each of the four corners. Using a block of wood I bend the short sides and the ½ inch overlaps to a 90 degree fold at the one inch point up the side. I then bend the long side with its bent ends over a short piece of wood to get a cage with one inch sides and about a three inch by 1½ inch top side.

Even with pieces of scrap hardware cloth where the wires do not run perfectly square, cutting squarely to the measurements and folding accurately makes a nice cage. Occasionally if one side is a bit deeper than the others, I simply trim the excess off with the wire snips to make each side the same depth.

Conclusion

If you have a hive or two that has come through the Winter with a lot of bees and is a strong candidate for a possible swarm, a split may reduce that possibility. While doing the split, the production of several new queens can easily be accomplished with the method suggested above. There is not a much more rewarding site than to inspect a frame in a nuc and see a brand new gorgeous queen cavorting around inside a homemade queen cage; unless you allow for the sight of a fully capped honey frame or two in your first season. There are other more efficient methods to increase the number of queens in your apiary if you need to produce many queens. I have found this to be an acceptable method for a hobby beekeeper like myself who only wants a few additional queens from that excellent honey producing hive, or that hive that seems to have superior traits and a superior queen and you have doubled or quadrupled your chances of getting that super queen you are after. Your beekeeping experience could vary based on your environmental conditions, experience or state of your hives. But if you are looking to add just a few queens to your apiary, give this method a try.

HONEY BEES JOIN HUMANS AS THE ONLY KNOWN ANIMALS THAT CAN TELL

Scarlett Howard & Adrian Dyer & Andrew Greentree & Jair Garcia

"Two, four, six, eight; bog in, don't wait."

As children, we learn numbers can either be even or odd. And there are many ways to categorise numbers as even or odd.

We may memorise the rule that numbers ending in 1, 3, 5, 7 or 9 are odd while numbers ending in 0, 2, 4, 6 or 8 are even. Or we may divide a number by 2 – where any whole number outcome means the number is even, otherwise it must be odd.

Similarly, when dealing with real-world objects we can use pairing. If we have an unpaired element left over, that means the number of objects was odd.

Until now odd and even categorisation, also called parity classification, had never been shown in non-human animals. In a new study, **published in** the journal Frontiers in Ecology and Evolution, we show honey bees can learn to do this.

Why is parity categorisation special?

Parity tasks (such as odd and even categorisation) are considered abstract and high-level **numerical concepts in humans**.

Interestingly, humans demonstrate accuracy, speed, language and spatial relationship biases when categorising numbers as odd or even. For example, we **tend to respond faster** to even numbers with actions performed by our right hand, and to odd numbers with actions performed by our left hand.

We are also faster, and more accurate, when categorising numbers as even compared to odd. And research has found children typically associate the word **"even" with "right" and "odd" with "left"**.

These studies suggest humans may have learnt biases and/or innate biases regarding odd and even numbers, which may have arisen either through evolution, cultural transmission or a combination of both.

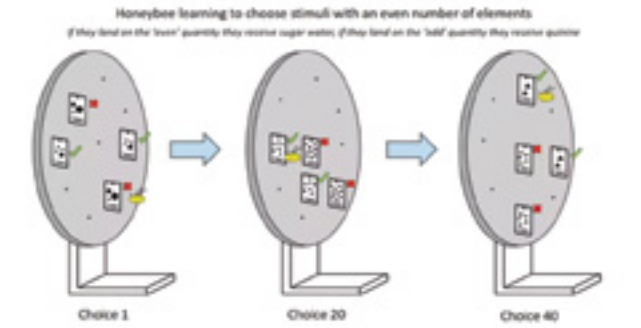
It isn't obvious why parity might be important beyond its use in mathematics, so the origins of these biases remain unclear. Understanding if and how other animals can recognise (or can learn to recognise) odd and even numbers could tell us more about our own history with parity.

Training bees to learn odd and even

Studies have shown honey bees can learn to **order quantities**, perform simple addition and subtraction, **match symbols with quantities** and **relate size and number concepts**.

To teach bees a parity task, we separated individuals into two groups. One was trained to associate even numbers with sugar water and odd numbers with a bitter-tasting liquid (quinine). The other group was trained to associate odd numbers with sugar water, and even numbers with quinine.

Here we show a honey bee being trained to associate 'even' stimuli with a reward over 40 training choices. Photo by: Scarlett Howard



We trained individual bees using comparisons of odd versus even numbers (with cards presenting 1-10 printed shapes) until they chose the correct answer with 80% accuracy.

Remarkably, the respective groups learnt at different rates. The bees trained to associate odd numbers with sugar water learnt quicker. Their learning bias towards odd numbers was the opposite of humans, who categorise even numbers more quickly.

We then tested each bee on new numbers not shown during the training. Impressively, they categorised the new numbers of 11 or 12 elements as odd or even with an accuracy of about 70%.

Our results showed the miniature brains of honey bees were able to understand the concepts of odd and even. So a large and complex human brain **consisting of 86 billion neurons**, and a miniature insect brain **with about 960,000 neurons**, could both categorise numbers by parity.

Does this mean the parity task was less complex than we'd previously thought? To find the answer, we turned to bio-inspired technology.

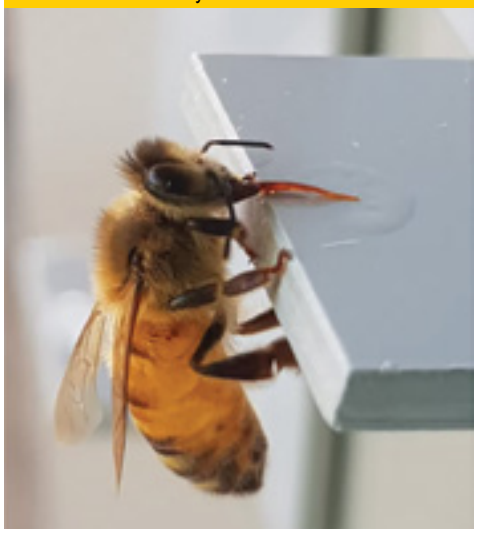
Creating a simple artificial neural network

Artificial neural networks were one of the first learning algorithms developed for machine learning. Inspired by biological neurons, these networks are scalable and can tackle complex recognition and classification tasks using **propositional logic**.

We constructed a simple artificial neural network with just five neurons to perform a parity test. We gave the network signals between zero and 40 pulses, which it classified as either odd or even. Despite its simplicity, the neural network correctly categorised the pulse numbers as odd or even with 100% accuracy.

This showed us that *in principle* parity categorisation does not require a large and complex brain

Honey bees landed on a platform to drink sugar water during the experiment.
Photo by: Scarlett Howard



such as a human's. However, this doesn't necessarily mean the bees and the simple neural network used the same mechanism to solve the task.

Simple or complex?

We don't yet know how the bees were able to perform the parity task. Explanations may include simple or complex processes. For example, the bees may have:

1. Paired elements to find an unpaired element
2. Performed division calculations – although division has not been previously demonstrated by bees
3. Counted each element and then applied the odd/even categorisation rule to the total quantity.

By teaching other animal species to discriminate between odd and even numbers, and perform other abstract mathematics, we can learn more about how maths and abstract thought emerged in humans.

Is discovering maths an inevitable consequence of intelligence? Or is maths somehow linked to the human brain? Are the differences between humans and other animals less than we previously thought? Perhaps we can glean these intellectual insights, if only we listen properly.

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Credit:

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THE DIFFERENCE BETWEEN ODD AND EVEN NUMBERS

Measuring Pollinator Attractiveness of Cultivated Flower Varieties

Laura Kraft, Ph.D.

As gardeners become more interested in seeking out pollinator-friendly plants, the horticulture industry has a growing need to reliably measure and label plants for their ability to attract bees, butterflies, flies and other pollinators. This is particularly important for the flowering plants found most often at your local nursery, where years of hybridization and selection for certain characteristics may have influenced the plants' attractiveness to local pollinator communities.

"There's this disconnect between what's labeled 'Good for Pollinators' and what's actually good for pollinators," says Emily Erickson, Ph.D., a postdoctoral researcher currently investigating population ecology at Tufts University. "There's no real standard protocol to assessing what pollinator attractiveness means for nursery plants."

Erickson's postdoctoral research aims to tackle this problem. In a study she conducted with colleagues at Penn State University and **published in May in the Journal of Economic Entomology**, her team found that, for many plants, 10 minutes is a sufficient observation time to determine attractiveness to pollinators. Further, they found that these observations could be done successfully by even novice observers with just a little bit of training.

Harnessing Citizen Science

Erickson is something of an expert at sitting in an oppressively hot field for hours, observing the pollinators arriving at flowers. She spent years doing exactly that during her graduate studies in the same lab group. When it came time to assess how to develop a protocol to get untrained individuals to make the same measurements that she had spent years practicing, she knew she had to ask for help. Erickson's team found an incredibly enthusiastic group of volunteers from the local Master Gardener program.

"There's a huge potential in this field for citizen science, but researchers can be wary of it because of concerns about observer error and data quality," she says. In their new study, Erickson's team set out to measure this error and to determine a minimum observation time for volunteer observers to quantify pollinator friendliness of new cultivars.

First, Erickson gave the volunteers a brief training on which pollinators they would likely encounter during the observation period but provided no additional help while volunteers observed on their own. As a comparison, Erickson's team observed the same plant cultivars for the same periods of time to determine novice error.

Verbena meteor shower. Photo by: Dr. Emily Erickson

The researchers also wanted to identify how long an individual plant should be observed to estimate different measures of attractiveness. To do this, Erickson watched each plant for 30 minutes and recorded which insects visited the plant and when. By spacing out observations over time and space, Erickson and colleagues learned some important parameters needed to measure pollinator attractiveness of cultivated plants.

In short, they found that a minimum observation time of 10 minutes accurately captures the pollinator

Flower Trials. Photo by: Dr. Emily Erickson

Melissodes bimaculatus on *portulaca* (sundial light pink). Photo by: Dr. Emily Erickson

visitation for a given cultivar and time of day. Furthermore, their team of Master Gardeners, despite having little to no experience observing pollinators prior, produced high quality observations after receiving a short training session.

What Makes a Plant Pollinator-Friendly?

For nursery plants, attractiveness to pollinators is often considered a static property. One of the most interesting outcomes of this research is showing that plant attractiveness appears to change based on the time of day or other factors, such as what other plants are in the vicinity. In one dramatic example, the observers noticed that the flowers of *Portulaca* 'Sundial Light Pink' would open in the morning and close in the afternoon. Observers didn't notice many pollinators visiting these flowers at all. As Erickson recalls, "I kept thinking I'm not going to get anything to this [flower]. I sat out there for 30 minutes and saw one syrphid fly. Then one day I show up and it was covered with the *Melissodes bimaculatus*." Based on these observations, *Portulaca* 'Sundial Light Pink' appeared to be a cultivar that provides an inconsistent reward for pollinators and would not be suitable to be labeled 'Pollinator-Friendly.'

In contrast, other flower cultivars had high pollinator abundance throughout the observation period. They seemed less affected by other background factors like time of day or nearby plants. These cultivars, which have consistent rewards for pollinators, would likely be more suitable candidates for the title of pollinator-friendly plants.

Additionally, Erickson's group found that merely looking at pollinator abundance is an insufficient measure of pollinator attractiveness, since cultivars that attract different groups of pollinators tend to attract different numbers of visitors overall. For example, flowers in the study that attract mostly bees received many more visits in 30 minutes than those that attracted mostly flies or butterflies. If total visitor abundance is the only measure considered, an assessment of plant attractiveness may undervalue cultivars that provide resources to more diverse pollinators. Says Erickson, "I think just broadening our understanding of what plant value means beyond just 'How many things overall does it attract?' is a really important consideration going forward."

Developing Solutions for the Floriculture Industry

Erickson's team worked closely with members of the floriculture industry when designing this research in the hopes of developing a standardized protocol that can be used to label new cultivars appropriately. The hope is that, in the future, pollinator attractiveness can be measured among other traits in breeding trials of new flower cultivars, allowing for more meaningful labeling to be used.

This will help gardeners and urban planners choose flower cultivars suited to supporting urban and residential pollinator habitats, particularly since cultivars, like fast fashion, are quickly replaced by the latest and greatest new blooms and often cannot be found again the next growing season.

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Photo Caption: The authors found significant differences in pollinator activity to closely related cultivars of flowers. For example, *Verbena* 'Meteor Shower' received lots of bee and butterfly visitors while *Verbena Lascar* 'Mango Orange' received very few visitors.

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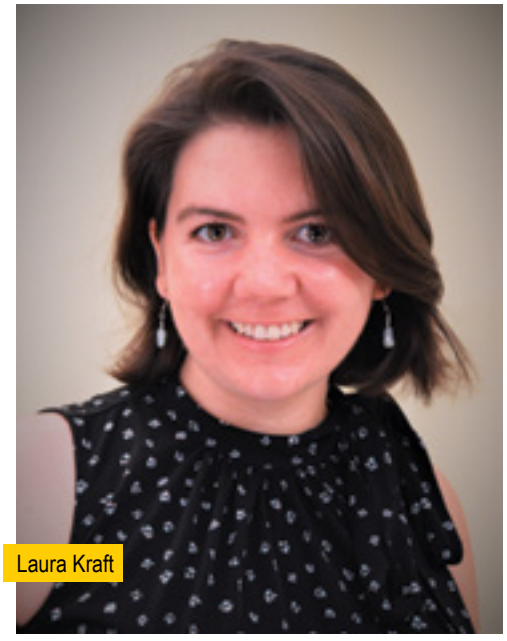
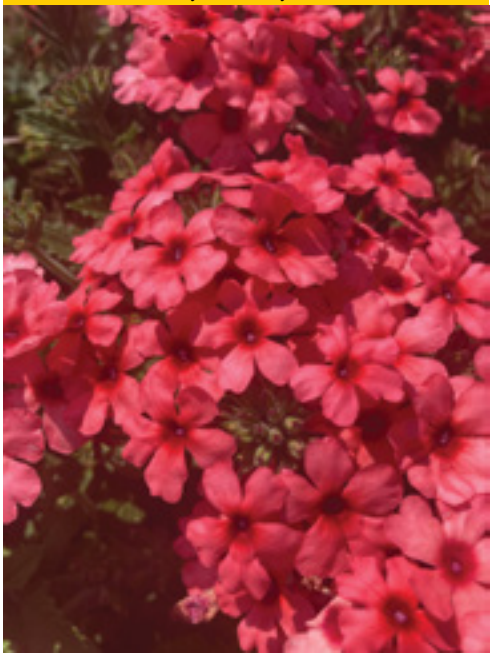
Dr. Emily Erickson



Laura Kraft

Verbena Lascar 'Mango Orange.' Photo by: Dr. Emily Erickson



The Quest to Save the World's Largest Bee

The Asian Giant Hornet (*Vespa mandarinia*) has been in the news in recent years having made landfall in North America in late 2019. At 1.5 to two inches long, *V. mandarinia* is the world's largest hornet. What most folks probably missed around the same time was news of the Giant Bee (*Magachile Pluto*). The giant bee is also known as the "Giant Mason Bee" or "Wallace's Giant Bee" in recognition of Alfred Wallace who collected and identified the bee in 1858. Wallace's bee was thought to be extinct until sightings of it were confirmed in 1981 after which sightings of this rare bee went unreported for over 35 years until 2018 when a specimen was sold on eBay. The following year a female giant bee living in a termite nest was filmed and photographed for the first time in the wild by Clay Bolt, an award winning natural history and conservation photographer who specializes in the bees of the world.

While the male giant bee only grows to 23mm (0.9 in) long, the female giant bee can reach 38mm (1.5 in) long and has a wingspan of 63.5mm (2.5 in) wide. *M Pluto* is believed to be the largest living bee species, dwarfing the world's largest honey bee *Apis Dorsata* (aka the giant honey bee) which reaches a maximum of 17-20mm (0.7-0.8 in) long.

Wallace's Giant Bee is a black resin bee with very large mandibles and a white band on its abdomen and all sightings have been limited to three islands in Indonesia: Bacan, Halmahera and Tidore. The giant bee protects itself from predators by building its nest in tree-dwelling termite mounds. Unlike honey bees that have to carry tree resins on their hind legs, the giant bee's large mandibles assist with the gathering and transport of large balls of resin. The resin is used to build compartments inside the termite nest, sealing off the bee's galleries from the termites. It is believed that the relationship of the bee with the termite may obligate, meaning that the bee may be entirely dependent on the tree-dwelling termites for its survival. Meanwhile, the expansion of palm oil plantations into much of the giant bee's former habitat has caused the International Union for Conservation of Nature to label *Magachile Pluto* as vulnerable.

I had the opportunity to speak with Clay Bolt who told me how the film he produced about the Rusty Patch bumble bee called "A ghost in the making" and his work to get the Rusty Patch bumble bee listed on the endangered species list led to a new friendship with an entomologist which in turn led to his effort to rediscover Wallace's giant bee. "…When I was doing work on the Rusty Patch in 2015 I met this guy Eli Wyman, a good friend of mine now, at the Museum of Natural History in New York where he was working, and he showed me a specimen of Wallace's giant bee that had been collected in 1981… Eli and I sort of fantasized about rediscovering it, and certainly as a photographer I would love to take the first photos of a living Wallace's giant bee. But there wasn't really any urgency at the time because it hadn't been seen in so long, but we started to do some work to figure out if we could find it, where the best place would be to find it, and that sort of thing."

It was while Eli and Clay were working on this idea of finding the giant bee that a specimen showed up on eBay. As Clay remembers, "… when it sold on eBay, at one point the bidding went up to $39,000, then the bid dropped much lower and we think it was somebody bidding against themselves trying to raise the price. It ended up selling for $9,000. That set off alarm bells for me in particular, because for me $9,000 is a lot, but when you're in that part of the world that's a tremendous amount of money, more than some people make in years. So, I was concerned because this bee lives in these boreal termite mounds that somebody could just go through and cut down every tree with a termite mound looking for the bee and sell them. At that point we felt this urgency to look for the bee and that's kind of why we ended up going and searching for it in 2019."

After Clay's 2019 trip, more specimens of the giant bee showed up on eBay and this seemed to confirm his worst fears. "One of the things I worried about before I went was if we rediscover it and we publicize it, it's a gamble because it means it is going to draw more attention to it, but I was under the mindset that because people are willing to pay this much money for it, the bee's either going to go extinct in obscurity and darkness or we are going to shine a light on the issue to try and fix it. That was a gamble that we decided to take." Bolt continues, "I immediately went to some connections I had in the Indonesian government and was like, this is a really special species you have, can you do anything to protect it? Through our experience and a presentation we gave, there was a lot of knowledge about birds in particular, but there wasn't a lot of focus on protecting insects, even though everybody had heard of Wallace, there was not a lot of familiarity with the bee. There was certainly a lot of fame especially because of Alfred Russell Wallace's travels and some of the amazing butterflies they have there like the bird wing butterfly, but there wasn't this general information or knowledge base about the bee even though it's super large. So basically, that meant that the government was like, we want to do something, but we have to put together this task force and all this kind of stuff. It was moving super slowly, and I was trying to feed information back to the government through contacts I had and it wasn't working so it occurred to me that if that wasn't going to be the route that we went then we would need to figure out something else, so the best we could do then was cut off the market."

As Bolt explains it, people who collect bee specimens from the forest will reach out to others who sell the

Megachile pluto, also known as **Wallace.'s giant bee** or ***raja ofu*** (lit. 'king of the bees.) -Wikipedia

bees for them, and while in search of a buyer, these sellers use private messaging through social media to find known insect collectors. "Luckily one particular person reached out to me and said 'I don't think this is right' and so he agreed to remain anonymous and kind of stay undercover and feed me information about who was approaching him, so I was able to gather information on some of the sellers and I took this to an organization called Traffic that regulates the trafficking of animals on the world's leading platforms like Facebook, eBay and Instagram. There are similar companies in China and Japan and other places, and there's a coalition of these companies that work with Traffic. So what ultimately ended up happening was I was able to get a set of guidelines from the Indonesian government which I gave to Traffic, and Traffic created a new rule for newly discovered or rediscovered species of plants, insects and other things that don't have formal protection. If those insects are flagged, they would no longer allow them to be sold if there was a risk, for example of species rarity and so that was a huge step forward. It took a while but that new rule in essence meant that anytime someone put the bee up online, it would be taken down immediately. The bee has popped up a couple times since then and just recently, as late last year, someone in California had about ten specimens they were selling for pretty cheap. They were in pretty bad condition, some of them had not fully emerged and you could tell that someone had ripped apart a nest… Because it was being sold from the U.S., Traffic was able to contact the U.S. Fish and Wildlife Service and that has pretty much shut down everything online.

"What was really interesting is that through this whole process, another contact reached out to me and it turns out that within Indonesia, there is a law that I think was developed in the late 90's or early 2000's that says basically no organism can be collected from Indonesia for sale unless the population has been analyzed and a quota has been set to ensure the species won't be over collected… So while going in search of the bee was a gamble, by bringing all of this up and sort of creating this conversation, we were able to essentially bring to life protections that we didn't know existed beforehand."

Thanks in part to Bolt's efforts, there is now an increased awareness in the conservation agency of Indonesia's North Maluku to try and preserve the giant bee. "I am hopeful now that the bee has a future separate from just being collected and of course people can sell them individually through underground channels but because that part of the world is quite remote, and because it is harder to sell the species now, it makes it a lot more difficult for people to traffic them."

What's next for Clay Bolt? "Right now I am working on a guide to the Bumblebees of the Americas which has never been done, so I am going to be travelling from the Arctic all the way down to the tip of Tierra La Fuego in South America over the next few years putting together this project. I'm excited about it because I think through education and creating more awareness, people will have a better sense of what's out there and by learning that I hope that people learn how to care for them and provide better protection for the bees. I've always loved connecting with these little creatures that are amazing and beautiful and quite frankly, need our help right now."

Ross Conrad lives in Middlebury, Vermont and is the author of *Natural Beekeeping,* Revised and Expanded 2nd edition, and *The Land of Milk and Honey: A history of beekeeping in Vermont.*

Wallace's Giant Bee is about four times the size of a honey bee worker. Photo Credit: ©Clay Bolt / claybolt.com

BEE VET

A Surgical Approach

Dr. Tracy Farone

Did you ever have a moment within the crazy pace of life where you suddenly stopped, looked around and asked yourself how (or why) did I get here? I find myself asking this question now that I seem immersed in swarms of all stuff bees, something I would never have imagined 10 years ago. What is the appeal? I suppose for many folks the reason or reasons for becoming a beekeeper are many and different: I wanted a hobby, my grandpa did it, I like to be outside in nature, I want to "save the bees," I like honey, I want to make money (ha-ha), etc. But it recently dawned on me that it is surgery. I am a surgeon. I do not mind getting my hands dirty. I like to examine things, take things apart, find the problem, hopefully fix the problem and put things back together for a positive outcome. That is beekeeping.

Really, think about it. A honey bee colony is a superorganism. Every time you sever the propolis barrier and open a colony you are looking at its guts. Donned in specialized PPE analogous to a surgeon, beekeepers review the workings of distinct parts of the organism's systems. During an inspection procedure, various parts of the hive normally unseen are revealed and more closely examined. Queen status, patterns in the brood and energy stores are evaluated. This assessment is a review of reproductive systems, metabolic systems excretory systems, immune systems, and even communication systems analogous to the endocrine and nervous systems within any mammal. Any abnormalities are noted, removed, cut out or treated with medications. Parts of the hive can be manipulated to put the colony into a healthier position. "Donated" parts from other hives can be added to colonies to replace damaged or missing components. Samples of tissue may be taken for definite diagnosis. But don't take too long, a patient's ability to thermoregulate can be affected by prolonged procedures. If you are a careful surgeon, you will only damage a few cells (smash a few bees) on your way in and out and the colony will heal any cracks in a few days. Many times, surgery can not only diagnose a problem, but it can also be the cure. Other times it can just provide the most accurate prognosis, whether good or grave. So, am I talking about beekeeping or surgery? Hmmm… like I said.

If you have had some struggles with keeping your bees, consider looking at it from a surgeon's perspective. No matter the subject, the details and intricacies of any topic can often seem complicated, but in both surgery and beekeeping, understanding and mastering a few, consistent practices can go a long way.

I have been hesitant to share this because I am sure as soon as I say it, bears will come and destroy all my honey bee colonies, and I do not want it to come off as a brag, even a humble one. However, so many beekeepers suffer 40% losses every Winter and I have been asked to share and summarize what I do by multiple beekeepers… so here goes… I have had 100% Winter survival for three Winters running. I started with one colony in 2019 and now I manage eighteen colonies as of yesterday (it is May). I could have many more colonies if I were actively trying to make more splits.

Disclaimer: This may not work for everyone in every situation, much may change or need adaptation regarding geography, operation size and purpose, but I am happy to share what has worked **for me** to this point and that I am starting to give away bees because I have too many. If this information helps you, awesome, if not, please turn the page to the next article.

Know thyself

With degrees in both biology and veterinary medicine, and decades of agricultural animal care experience… I **still** studied honey bees for two to three years, observed dozens of other beekeepers and scientists, the good, the bad and the ugly, **before** I became a keeper of honey bees. This certainly does not mean you have to have multiple degrees or certifications to be a good beekeeper, but it sure does help to spend considerable time researching what you are doing before you start doing it. You must understand anatomy before you can do any cutting.

A favorable diagnosis.

Know how to diagnose the guts of your hive.

Drone & PPE

Biosecurity

I only perpetuate or raise my own stock and queens. Period. I have never brought any outside bees into my yards. Only new equipment is used, and equipment is not shared outside of my yards. There is double electric fencing around my yards. Mouse guards are in place all year round. The local police are my friends. I wash my jacket once in awhile.

Nutrition

I leave some honey on... one or two honey supers over Winter or at least 60 lbs. (I live in Western Pennsylvania). It is their best food. The hives are located near water that is available year-round. Dry sugar is fed in January and pollen patties added in February, whether they need it or not. All supplemental feed is removed in April. A 1:1 sugar syrup may be fed during dearth, if needed or just leave some Spring honey on.

Medical management

Varroa. I test hives with an alcohol wash at least three times a year; Spring/Summer/Fall. This allows for treatment adjustments, if needed. Currently, all my hives are on this *Varroa* treatment plan: Apivar (amitraz) in Summer, after Spring extraction and before Fall supering, and OA vaporization, three times once a week in November and maybe a fourth time in December, pending weather. I remove drone brood, if it is convenient, during a hive inspection. Between swarms and splits there are natural brood breaks in my hives.

Antibiotics are never used on my bees.

I keep hives on gravel or another dirt barrier. This can reduce several different pests.

Hives must be checked at least on a weekly basis all year round. This means mostly external exams in the Winter but during the beekeeping season, internal inspections may be required weekly. You must know the when, how, why in doing a proper hive inspection and what it means. If you do not, please do not keep honey bees until you do.

General management techniques

These are the things that beekeepers will talk about until they ate all the donuts and drank all the coffee. What is "best" probably depends on your given situation. Here are some things I do:

1) Top entrance
2) Solid bottom board
3) Insulation board inside the outer cover of hives in the Winter; consider wind blocks that may work in your area
4) Limit pesticide use in yards
5) Freeze unused drawn comb frames
6) Keep detailed records on hives
7) Overwinter hives in two to four boxes depending on colony size, deeps or mediums, eight or 10 frame... whatever

Consider biosecurity risks in your yard.

Other disclaimers

I am not doing this as a (main) living. I have a small sample size. I have not been doing this for 50 years. (Although my great grandfather had a few hives at one point. Does that make me a fourth generation beekeeper?). I am not perfect. I have lost swarms and a couple of queens/colonies during the Summer due to robbing and failure to re-queen.

I hope this sharing of best practices can help you in planning out your operation!

Minding Your Bees And Cues

Robbing the Honey Bank

Becky Masterman & Bridget Mendel

Honey bee management inspection protocols change throughout the season and beekeepers need to look to the flowers for guidance. When nectar availability is limited, honey bee robbing (worker bees from other colonies stealing nectar and honey) should be a concern. Honey robbing is a complex foraging strategy that is associated with increased defensiveness and aggression in both the robbers and colonies being robbed (Grume et al. 2021) If threatened by robbing, your colonies will be forced to move workers from foraging to colony protection. Robbing can strip a colony of resources in the blink of a compound eye, and the colony could end up perishing.

Sometimes, it's hard to recognize robbing. It can start out innocently as bees landing on a frame that you have removed to inspect a colony (Figure 1). A bee sipping nectar from this frame can return to her hive and report the location of the easily accessed, sweet carbohydrate and recruit her sisters to the open hive. When floral resources are plentiful, this happens infrequently. In a nectar dearth, this difficult to notice frame visit can lead to chaos in your apiary (Figure 2).

Beekeepers with less experience often recognize the signs of robbing only when their colony is under full attack. At this point, there are some obvious signs that are easy to identify. First, you will see bees fighting each other at the hive entrance. Guard bees will engage robbers and try to remove them or keep them out of the hive. The other identifier is the way that robbers attempt to enter the hive wherever the boxes meet, not just at the hive entrance (Figure 2).

Other robbing signs that a beekeeper can learn to identify is how the bees look and fly. Over time, an experienced robber will have engaged in fighting and lost hair. These bees appear shiny and the black cuticle of their thoraces are easily visible when hairless. Bees robbing a hive also have a characteristic flight pattern. In a series of elegant behavioral experiments, Free (1954) investigated the swaying flight behavior of bees robbing hives. He trained bees to forage in a hive without bees and then moved a populated hive to the same site, creating a robbing event when the trained foragers returned. As a result of congestion at the hive entrance, the trained foragers turned robbers would sway in flight as they approached the entrance. The author hypothesized that the swayers were waiting for an opportunity to enter the hive without being stopped by guard bees. The swaying flight be-

Figure 1. Setting a frame outside of a hive to make colony inspection is a safe management technique when nectar is flowing. In a nectar dearth, opportunistic robber bees might land on the frame and not be noticed by the beekeeper.
Photo Credit: Rebecca Masterman

havior was also noted to be a cue to guard bees of a possible threat. Evidence suggested that swaying flight was caused by entrance congestion; it also happens at hives that are not under attack but are experiencing heavy flight activity due to foraging or orientation flights.

You can take steps to limit robbing in your apiary. During times of nectar dearth, reducing hive entrances so hives are easier to defend can help your bees stop the threat of robbers (Free, 1954). Robbing screens are also effective ways to deter robbing bees. Most importantly, when you manage your bees during nectar dearth periods, do not leave hives open or frames out if possible. Extra bee equipment can go a long way in preventing robbing. If you cover open boxes that are not being inspected and place frames in empty boxes if you need to remove them for easier inspection of the colony, you can limit the exposure of your colonies.

Some days the Bee Squad apiary at the University of Minnesota looks like laundry day at a boarding house. There are times when data need to be collected and all colonies need to be opened. Robbing is inevitable, and measures will need to be taken to stop it. In addition to reducing hive entrances (NEVER completely close them!) we use wet sheets to cover the hives and protect them from robbers. It means that returning foragers end up sitting on the wet sheets and flight departures are delayed until the crisis is averted, but it also provides a measure of protection from the robber bees.

Unfortunately, you can't stop your bees from robbing other colonies. Before you start getting excited about any extra honey for your apiary, consider the risk when your bees enter other hives. Lindström *et al.* (2008) demonstrated that American Foulbrood (AFB) or *Paenibacillus larvae* spores can be moved by robber bees from diseased or dead AFB colonies to their own. This transmission caused infection in colonies within one kilometer of the AFB colonies. Although the risk of robbing and AFB transmission was described by earlier researchers, this study demonstrated that the highest risk was infected colonies within the one kilometer range.

Too many bee management topics lead to *varroa* and the viruses they vector. Researchers have suspected that colonies collapsing from *varroa* and vectored viruses have been a source of pest infestation and research has explored the role of robber honey bees in transmitting *varroa* mites (and the viruses their vector) back to colonies (Frey and Rosenkranz (2014), Peck and Seeley (2019) and Kulhanek et al. (2021). Readers, stay tuned as this research suggests that the process is complex and deserves more exploration. Regardless, Kulhanek et al. (2021) recommends that robbing screens could help to mitigate this issue.

Knowing the signs of honey bee robbing behavior along with smart management protocols when robbing risks are highest can keep your management season a little less eventful. Combined with strong, healthy colonies and a dedicated *varroa* monitoring schedule to pick up population spikes that your bees might have manifested, you can keep the drama out of your apiary and the honey in your hives.

Figure 2. Chaos in the apiary when robbing is rampant. Note the bees on the box seams, the beekeper reducing the entrances and a pile of sheets about to be placed on the hives to reduce robbing. **Photo Credit:** Judy Griesedieck

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

REMEMBERING DR. ERIC MUSSEN

Kathy Keatley Garvey

Honey Bee Authority Dr. Eric Mussen Passes

Celebrated honey bee authority **Dr. Eric Carnes Mussen**, an internationally known 38-year California Cooperative Extension apiculturist and an invaluable member of the UC Davis Department of Entomology and Nematology faculty, died Friday, June 3 from liver cancer. He was 78.

Dr. Mussen, a resident of Davis, was admitted to a local hospital on May 25. He was diagnosed with liver cancer/failure on May 31 and returned to the family home June 1 for hospice care. He passed away the evening of June 3.

"Eric was a giant in the field of apiculture," said **Steve Nadler**, professor and chair of the UC Davis Department of Entomology and Nematology. "The impact of his work stretched far beyond California."

Dr. Mussen, known to all as "Eric," joined the UC Davis entomology department in 1976. Although he retired in 2014, he continued his many activities until a few weeks prior to his death. For nearly four decades, he drew praise as "the honey bee guru," "the pulse of the bee industry" and as "the go-to person" when consumers, scientists, researchers, students and the news media sought answers about honey bees.

"Eric's passing is a huge loss," said longtime colleague **Lynn Kimsey**, director of the **Bohart Museum of Entomology** and a UC Davis distinguished professor of entomology. "He was always the go-to person for all things honey bee. He worked happily with hobbyists, commercial beekeepers and anyone just generally interested."

Colleagues described Mussen as the "premier authority on bees and pollination in California, and one of the top beekeeping authorities nationwide," "a treasure to the beekeeping industry" and "a walking encyclopedia when it comes to honey bees."

Norman Gary, a noted UC Davis emeritus professor of entomology who served as a faculty member from 1962 to 1994, described Eric as "by far, the best Extension apiculturist in this country."

"Eric's career was so productive and exciting that a book would be required to do justice for his many contributions to his profession as extension entomologist specializing in apiculture, better known as beekeeping," Gary said. "His mission basically was facilitating productive and reciprocal communication between beekeeping researchers at UC Davis, commercial beekeeping as it affects California's vast needs for the pollination of agricultural crops, providing helpful information to hobby beekeepers and educating the general public concerning honey bees. His great professional successes in all areas have been recognized around the world. He has received numerous awards, especially from the beekeeping industry. He was by far the best Extension apiculturist in this country!"

"In addition to professional duties, he enthusiastically tackled other projects for entomology faculty," Gary said. "For example, he critically reviewed most of my publications, including scientific papers, books and bulletins. He worked diligently to help create the Western Apicultural Society and later served as president. (Mussen served six terms as president, the last term in 2017.) I especially appreciated his volunteering to moderate a video that historically summarized and recorded my entire 32-year career at UC Davis. And his tribute would not be complete without mentioning that he was one of my favorite fishing buddies."

See more at **https://bit.ly/3zi9Jdi**

Dr. Eric Mussen

HONEY BEES: SHOULD THEY BE BANNED FROM NATIVE PLANT RESTORATION AREAS?

Kathy Keatley Garvey

Phacelia, a California native plant. (Photo by Kathy Keatley Garvey)

What's a honey bee to do?

The dwindling resources of pollen and nectar producing plants in California greatly concern bee scientists and beekeepers, and rightfully so.

But the dwindling resources also greatly concern native pollinator specialists and native plant enthusiasts. Some worry that honey bees, which are non-natives, may be "reducing" or "eliminating" native pollinators through competition for food.

Are they?

Extension apiculturist Dr. Eric Mussen of the UC Davis Department of Entomology and Nematology explains that a number of agencies and organizations are cooperating in an effort to "restore" regions of the California Central Valley to their "original state."

"The major emphases are (1) replacing non-native vegetation with native plants and (2) encouraging native animals to return to their former ranges," Mussen says. "The result has been eviction of beekeepers from apiary locations that have been used for decades as seasonal spots for rebuilding populations following the stresses of commercial pollination or for producing honey."

"While removing this non-native pollinator from an environment may sound rational at first, it may not be the best idea," Mussen points out. "In most cases, it is not the presence of honey bees that has depressed or eliminated the populations of native pollinators. In fact, no studies have shown that honey bees eliminate native pollinators. In some cases, the populations of native pollinators have been reduced by honey bee competition, but following removal of honey bees the native bees built back to usual levels in a couple years."

Indeed, in some situations, honey bees can survive, and native pollinators can't.

"With honey bees, if we provide them with an adequate hive and food sources, they are likely to survive," Mussen says. "However, native pollinators can be very particular about the environment in which they can exist. If their nesting habitat is disturbed, modified or destroyed, they cannot live in the area, despite an abundance of food plants. In many California locations, it is habitat alteration or destruction, not lack of food, which eliminated the native pollinators."

When native habitats are compromised, "honey bees may be essential to foster initial re-establishment of native plant populations," Mussen relates. "Those plants provide food and shelter for wildlife and assist significantly in erosion control. Until the habitat is restored adequately to meet the requirements of native pollinators, it is likely that the presence of honey bees will be much more beneficial than detrimental in keeping the California native plants pollinated and reproducing."

Robbin Thorp, native pollinator specialist. (Photo by Kathy Keatley Garvey)

Eric Mussen, honey bee expert. (Photo by Kathy Keatley Garvey)

So, should honey bees be banned from restoration areas?

"No," Mussen says. "Honey bees should be solicited for restoration areas, not banned."

Mussen shares a list of 130 native California plants that are likely to be visited – "and probably pollinated" – by honey bees. They include button bush or button willow, fiddleneck and California golden poppy. The list is excerpted from Nectar and Pollen Plants of California by G. H. Vansell UC Berkeley, plus personal observations by native pollinator specialist Robbin Thorp, UC Davis emeritus professor of entomology. The list is updated, reflecting information on the CalFlora website and the Jepson Manual of Higher Plants of California.

Thorp, who monitors the Häagen-Dazs Honey Bee Haven, planted in the fall of 2009 on Bee Biology Road, UC Davis, has found more than 80 different species of bees – and counting – in the half-acre bee garden. It's located next to the apiary at the Harry H. Laidlaw Jr. Honey Bee Research Facility.

So honey bees and native bees share the resources.

Cattleman Includes Honey Business

James Howard

In the flatlands of South Georgia, honey flows rich and golden. One man takes his heritage of farming and blends it with another. Jason Deloach of Valdosta, GA grew up loving the country and farming. His grandfather was big into the pecan industry and the love of farming grabbed Jason.

He became a cattleman raising beef. He lobbied hard in politics for the beef industry. He planted clover and other vegetation for his cattle. He and his son were working and watching and found no honey bees were coming to the clover. He and Mack, his son, watched and decided that hives would be a good project.

Jason is a man who values time with his son, and they've worked projects together as dad and son to build a strong relationship. They bought a hive in 2017 and worked it. Soon they bought another hive. They enjoyed this venture and found that a program in Virginia for cattleman was adding a bee program as another aspect of livestock for agriculture. They went to this program and learned points of strategy to incorporate into their business.

As time passed by, their number of hives grew. Jason inherited a building that his grandfather owned that he used for his pecan business. He and Mack decided that cattle and bees could be run side by side as a business to incorporate more honey production in the area. They worked the hives and grew as father and son while working together. They enjoyed learning things about the business and caring for the hives together. They had worked with hogs, gardens and other projects.

They extracted the honey in the pecan warehouse and bottled and boxed it. They sold to their friends and other people who'd heard of their venture. Jason worked up a new concept in his mind of having a bee shop, with a deli on the side. He wanted to bring that model to the area. He'd had a retail shop downtown and desired to bring agritourism to downtown Valdosta.

They have a garden in the back with flowers, and they have pollinators onsite at the shop. His love for the community and people keeps Jason searching for ways to beautify the downtown area. Many communities have abandoned the heart of the city in the past, but Jason desires to build it up again.

He came up with the concept of having breakfast with bacon, eggs, grits and of course, biscuits with honey on Friday and Saturday mornings for a good price. This has been a great time for him and his son, as it draws people in, and they are able to see bees in their natural habitat of pollinating.

They have the hives in areas of flatland swamp, with plants such as clover, San sumac, citrus trees, blackberries and other berries. These bring heavy harvest times and they have plenty to process and bottle.

One thing people need to realize is that local honey is the best, for it has local pollen that helps seasonal allergies for that area. I find honey in grocery stores from South America, India and other countries mixed. That doesn't help people with local allergies. Make sure to read the label!

As A. I. Root was a man of faith who left a legacy in *Bee Culture Magazine*, Jason desires to leave a legacy of faith to his children. The whole point of his venturing out was to have something that could connect him and his son together and in this regard, he believes that working the bees and the cattle is a tremendous step forward in this plan.

There are many reports coming forth that a food shortage and famine are coming. Jason knows that his honey is a nutritious commodity.

Here are a few of the good things honey can do for the body:

Honey has a few nutrients, but is loaded with rich antioxidants, phenolic acids and flavonoids. These help keep the free radicals that cause many health issues down. Because of the health benefits, many unscrupulous people mix sugar syrup with it in other countries and try to pass it off in the U.S.A. This is another reason to get to know your honey provider as they are providing you with a rich source of food.

Jason knows that integrity in business is what keeps customers happy, and a happy customer will bring return business and tell others of their positive experience. So, all in all, Jason DeLoach and his son Mack are growing together as father and son while producing a product for the sweet tooth.

Bees and Women

Nina Bagley

Mrs. Ellen S. Tupper was a complex and cunning woman beekeeper in the 1800's that all beekeepers should know. She was born into an affluent family in 1822 in Providence, Rhode Island and was later known as the "Queen of Iowa." She was arrested for forgery and diagnosed as being insane in 1876. Lots of information can be found about Ellen Smith Tupper; in fact she is the most talked about of the women beekeepers in the 1800's. Her achievement in helping to educate women in beekeeping gave her the title "Queen of Iowa" which she earned honestly! She was an intelligent woman and had a drive to educate young women in the sciences, especially beekeeping.

After collecting all the information I had about her from my books, bee magazines and online, I started digging to find out more about her life so I could tell her story in a different light. (Unfortunately, you could do a million good things, but it's the one bad thing you do that people remember.)

Ms. Ellen S. Smith married Allen Tupper, a lumberman and aspiring Baptist Minister in 1843. Due to her poor health and advice from her doctors, she and her husband moved the family to Brighten, Iowa in 1850 where they purchased a farmhouse through a land grant. They had eleven children; her early years in Iowa were not easy ones. She encountered hardships: flooding and the loss of two children to cholera. Unfortunately, at the end of the 1850's her husband's business and health failed.

She wrote, "Allen's… wealth melted away like dew before the sun," and to make matters worse, like many men at that time, Mr. Tupper went off to fight in the Civil War. He was 57 years old when he returned home.

Teaching and beekeeping allowed women the freedom to be independent and be respected by their peers. Ellen Smith Tupper saw an opportunity to teach women the subject of bees while writing in her entomological journal about her beekeeping knowledge. She spoke German and French and was well on her way to rising to the standards of a well-known apiarist at the time such as Huber, Berlepsch, Dadant, Wagner and Dzierzon. She studied The Dzierzon's Theory (parthenogenesis) and claimed to have been successful at fertilization in a confined environment and wrote, she "cannot consider an Italian queen pure whose royal daughters are not duplicates of her." In the 1860's beekeepers realized that fertilization experiments under controlled conditions were needed to find the answers to the mechanism of bee heredity. But unfortunately, the reports on Tupper's pure queens were received with large skepticism by other beekeepers. Her caged-in confinement approach seem to have failed; this was a time of classical genetics and an apiarist remarked that it was a valid question of "whether she was deceiving herself or trying to deceive others." Adam Grimm, a queen breeder at the time, visited Mrs. Tupper's apiary while she was away and "found no difference in the queens he had and the ones she raised."

But despite this, over the years she became America's distinguished lady writer in *Bee Culture* during and shortly after the Civil War. She was the first female lecturer at the State Agricultural College of Iowa. Tupper played a major role in recruiting women from the Temperance Movement, to become part of the world of bees. She was the associated editor of the *National Bee Journal* which was a monthly periodical published from 1870-1874 before she purchased it in 1873. She also wrote for the Prairie Farmer, *American Bee Journal* and Youths' Companion.

Mrs. Tupper's next and last business venture was with Mrs. Annie Savory, a philanthropist and wealthy businesswomen from Des Moines, Iowa. In 1871, the two women started the Iowa Italian Bee Company to support and sell honey bees in the American Midwest. Annie Savory provided "Abundant Capital" in the company in the amount of ten thousand dollars, which was a lot of money for someone "who didn't know a bee from a yellow jacket," as Mrs. Tupper wrote, while she had the knowledge and the expertise in keeping bees. They even financed Dadant to travel to Lake Como, Italy in July 1872 to import bees, but unfortunately it was a huge failure. The two women made mistakes planning the shipping and handling, resulting in the loss of many bees during transportation. Both women blamed the Italians for the careless packaging of the bees. Business didn't go smoothly, and lack of experience caused the company to fold. Ellen S. Tupper and Annie Savory parted ways in 1873 supposedly with no hard feelings between them.

The Savorys' lost most of their belongings in a house fire shortly afterward and eventually moved out of Des Moines to another territory. Tupper lost 300 hives in a fire and collected the insurance – there was talk and skepticism about the fire. During this period, it is believed that she was passing bad bank notes. Ellen S. Tupper was well-received by her peers and friends; she was an entomologist of "continental reputation," however "Robbing Peter to pay Paul" was finally catching up with her. The scheme of her activity was to substitute old notes when they came due with new ones. I'm not sure when she started getting into financial trouble, but it was probably during or after the Civil War. In 1876, she was arrested with the charge of forgery. Accusations wrote, "It appears that she freely used the names of relatives' friends, and in addition, forged the names of leading citizens of various cities of Iowa," including a personal friend of Abraham Lincoln!

Beekeepers Column

The article below in reference to the arrest of Mrs. Ellen S. Tupper

from the Currol County Mirror of Illinois, which will be read with interest by all beekeepers:

Monticello, Iowa, 1876

"Mrs. Ellen S. Tupper, a long time resident of Des Moines, Iowa, has recently been arrested for the alleged crime of forgery. Heretofore she has born an unblemished character. She with her husband came to this State about twenty years ago with $2,000, with which they went into business, and finally failed, when from that time to the present they have been carrying on an extensive bee trade, her husband being during most of the time, unable to secure any labor; threw upon her the burden of providing for the family, which she did with wonderful success. She is a woman of high culture and refinement and is known all over the States as the "head center of this business."

Immediately after her arrest Ellen S. Tupper went into violent spasms, becoming bewildered. Her physician was immediately telegraphed, but being unable to leave, sent his partner. Sherriff Babcock made the arrest, assigning Mrs. Tupper to "comfortable quarters" in the county jail. She was released some time in February 1876, the reason unclear. She tried leaving Iowa, slightly angry with the reporters who were interfering with her journey. Ellen Tupper rebuked them and referred them to the newspapers that "knew more about her movements and conditions then she did."

She failed to show up to her arraignment in June and was under two bonds by mid-1876, to answer to indictments in Davenport on the grounds of "forgery" and one for "uttering false notes as true ones." It took the authorities some time to find her whereabouts, but they finally found her in August living on a farm that her husband had lived in for some years. The officers were surprised by the comfortable home they found: a large homestead of 160 acres with another 160 acres as a "timber claim" (Anonymous 1876). Ellen Tupper was released from custody; once again her lawyer presented two bonds, and the prominent signatures on the bonds indicated the strong support she still had from relatives and friends. Her trial was in February 1877, but being unable to obtain a lawyer, Ellen Tupper's daughter formed a team of local "advantageous" lawyers. The defense prepared that Mrs. Tupper was "insane and thus not responsible for her doings." In the Midwest newspapers, they described Tupper as an insane person. The Chicago Tribune reported that her family physician had declared that "she was decidedly a monomaniac on money affairs" and "not of sound mind." Her lawyer argued that the insanity she inherited from her relatives has shown itself in her grandfather, aunt and nephew. He emphasized that while the victims "should have their money," Ellen S. Tupper was "penniless" and "without a descent place to lay her head." The judge instructed the jury on reasonable doubt in regard to sanity. "That the law of the state shields or excuses every person from punishment for wrongful and criminal acts when done in a state of insanity." The trial took a whole week and the courtroom was standing room only with Tupper's family and many supportive women from the suffragettes present. Her brother, the Rev. James Wheaton Smith, who testified "the constant strain of mind in the work to support her family, has been enough to set a dozen women crazy."

She was released for the third time to her daughter Kate, who was influential during her mother's trial. I guess you can say the third time is a charm, she was found not guilty due to insanity.

It's difficult to conceive what her motives were in committing such a crime as "forgery." It made me wonder, she had to be self-possessed for the banks to trust her motives and I'm sure her family's background made her scheme easier. Ellen Smith's family was very influential, which most likely was how she was able to get away with forging the signatures of her father's friends, and her relatives, including writing James Harlan's signature, the close friend of Abraham Lincoln!

Her father, Noah Smith Jr. was one of the better-known political leaders in Maine. As a lawyer, Smith moved his family to Calais, Maine, in 1830. He soon became very involved in the state's politics. For a number of years he was an active member of the Maine Legislature, which opened the door for him to become speaker of the Maine House of Representatives in 1854. In 1858, Smith became the Secretary of State. When a dear friend, the Honorable Hannibal Hamlin was elected as vice president, he secured Smith in the seat of secretary of the United States Senate. Later, Smith would become the legislative clerk of the Senate. He was also acquainted with President Lincoln. Ellen's mother was Hanna Draper Wheaton. Mrs. Wheaton's family was influential as well. Her maternal uncle, Henry Wheaton, became a professor at the medical school at Brown University in 1812. He was the United States Supreme Court reporter from 1816 to 1827. Henry Wheaton's diplomatic career spanned the administrations of six presidents from John Quincy Adams who appointed him, to James K. Polk who dismissed him. He was offered a lectureship in civil and international law at Harvard, but was prevented from preparing his lectures by ill health. He died on March 11, 1848.

Ellen Smith's first cousin Charles Jackson was Governor of Rhode Island, 1845-1846. It became clear to me how she might have been protected to avoid tarnishing her family's name. I can also understand why she was able to move around and use the names of these prominent people because her family was prominent as well. I believe they never suspected her motives so it's unfortunate that Ellen Tupper was arrested for forgery, but until one walks in her shoes, we can't judge her. Struggling to keep it together in the 1800's was no picnic to say the least! I suspect that she was keeping up appearances and doing the best she could to keep her family in the lifestyle she was accustomed to. Crazy or not, she committed a criminal act but she probably didn't see it that way. I would like to believe she intended to pay her victims back before she was discovered. She spent the remainder of her life writing and traveling. Her last visit was with her daughter Margaret in El Paso, Texas in 1888, where she passed away of heart failure leaving behind a legacy of "*Bee Culture*." Two of her daughters became Unitarian ministers, another daughter became a teacher and her grandson Allen True Tupper, became a famous artist who specialized in depicting the American West. Two hundred years later, we are still talking about Ellen Smith Tupper, "Queen of Iowa."

Nina M. Bagley
Columbus, Ohio.

From Alaska to Scotland:

in Search of History, Honey Bees and Sustainability

Lisa Hay

Recently I traveled to Scotland with my son in order to spend some quality time with him and to introduce him to some of the history of our family. Being a beekeeper, I asked the Scottish Beekeepers Association if I could meet with some of their beekeepers in the interest of exchanging ideas and learning how they keep their bees during Winter because overwintering is one of my particular interests. I was also interested in what the Scottish Beekeepers do about moisture in their hives during the cold season. We live in the Interior of Alaska, which is considered part of the subarctic and while we have a flourishing beekeeping community in this area of our state, there has been little information or research done on overwintering our bees, so anything we can learn from other areas that might be applicable is worth its weight in honey. Even though I live at latitude 64 and Scotland is around latitude 56, we beekeepers share some common beekeeping issues. One in particular, that is on the list of what kills our bees during the Alaskan Winter months, is what to do about the moisture that builds up in a hive when the bees are clustered inside and the temperature outside is too cold for them to fly.

Being an online member of various beekeeping forums, following blogs, Instagram and Twitter accounts of different beekeepers and associations has enabled me to not only continue my ongoing learning of beekeeping but also to be able to ask specific questions of beekeepers that I would have never come in contact with otherwise. The Scottish Beekeepers Association is one of the Twitter accounts that I follow and that is to whom I reached out to request an apiary visit while we were traveling the country.

Michelle Berry, the Development Officer and Magazine Editor for the Scottish Beekeepers Association was kind and generous enough with her time to respond to my message

and set up some introductions with various members of SBA around the country. I was contacted by a handful who offered to make themselves available to us for an apiary visit and a chat about Scottish beekeeping practices. Because my son and I were traveling around the country, staying a few days here, and a few days there, we weren't able to coordinate schedules with anyone other Ann Chilcott, Scottish Expert Beemaster, in Nairn, which is close to Inverness, where we were staying at the time. Ann is also author of the blog called *The Beelistener*, as well as many articles on beekeeping in various beekeeping publications. She teaches classes on different aspects of beekeeping; she hosts beekeeping researchers from other areas of the world and she speaks internationally on the subject. Ann supports beekeepers at local level and chairs Nairn & District Beekeepers' Association.

Before we left to visit Ann's apiary, I read her latest blog post which was on her dissection of a wasp that she found at her office. Included in the blog post was a photo of the eviscerated wasp with its vitellogenin spread out. I was immediately excited because one of the major focuses on Interior Alaska colony management as Winter approaches is doing all that we can to encourage the development of Winter bees. Winter bees are laid by the queen at the end of the season, typically mid-October, as we are preparing to hive them up for our Winter which can last into April. Hive up time is when the daytime temperature is a consistent 32°F/0°C. That's our cue to seal them up if we're wintering them outdoors, where our Winter temperatures can reach -60°F or get them in the bee barn, where the temperature is maintained between 41-43°F.

As we drove to Ann's, we continued to be charmed by the Highland landscape. I was eager to meet Ann. Our emails to each other after the introduction from Michelle were formal, but I was excited about what I would learn from her and the conversations I was anticipating. I'm always excited to meet other beekeepers. Particularly in places outside of Alaska. We beekeepers have a language of universally known terminology and a passion for everything involved in tending to honey bees. It makes it easy to talk bees, compare notes and experiences and share knowledge, regardless of where we live.

When we arrived, Ann and her husband were outside to welcome us. They greeted us by coming out to our car with big smiles and a warmth that made me feel like I was meeting with old friends. Ann guided us towards her home and told me of the agenda she had planned. She said that she would show me her apiary and how she prepares her colonies for Winter, we would meet with Cynthia May who keeps bees at a local distillery and then also visit a free-living bee tree. Honey bees are not native to Alaska and we don't have any bee trees. Not only was I was honored that Ann hosted our visit and I was absolutely thrilled to be able to spend time with her and pick her brain, but being able to see wild living bees was thrilling.

Ann then showed me her hives and we talked about the differences between hers and mine. She showed me a WBC hive, which I had never seen, along with the traditional Langstroth hives and polystyrene Nucs she uses. Her bees were still a bit active at the end of October, but we were able to open the tops so she

could show me the wool she uses for insulation. In Alaska, we use foam board insulation panels inside our hives and a moisture quilt, wood chips, corkboard or whatever else we've found that works to keep heat in and absorb the condensation produced by the evaporation coming off of the bees. After looking at her hives and talking shop, we went on a hike to the bee tree.

I have always been interested in how bees survive in the wild. They construct their hives in ways that work for them. We put them in hives that work for us. I have wanted to make my hives closer to what a honey bee would build inside of a tree but haven't gotten the time yet. I've even saved some sections of a 100+ year old tree that needed to be taken down due to an infestation of carpenter ants that had eaten away the inside of the base. These sections will be made into hives similar to what I've seen in pictures of Eastern European tree hives. In the far North, most of us use traditional Langstroth hives or polystyrene hives of the same shape. Some have experimented with top bar hives but they are difficult to insulate and awkward to move. We have to house our bees with practicality and Winter in mind. By themselves, the wood Langstroth hives have an R value around one and if wintered outdoors require a lot of insulation both outside of the hive as well as inside the top of the hive, whereas the polystyrene hives have an R value at least six times that amount and require less added insulation. An actual bee tree gives us an excellent example of how bees construct their home. It is very different than the hives that beekeepers use and I was anxious to see it, photograph it and take notes.

Ann told us that she discovered the tree while out on a walk. She had noticed some bees that were too far from her apiary to be her bees so she figured that they were living in the forest. She followed the bees, and kept her eyes out for a tree that would accommodate them. It wasn't long before she discovered the hive. As we walked, I too, kept my eyes open for a tree that bees would be attracted to. When we finally reached the bee tree, which was large and had a split in the middle, maybe from a lightning strike, we approached it slowly so as not to disturb the bees. Ann and I sat in front of the hive and watched them. I was mesmerized. The hive was not too far up the tree. We could see a few bees coming in and out. The opening was a slit in the tree and it had two holes. They were vertically spaced and a few inches apart. There was enough room for bees to enter or exit one at a time. Propolis sealed the rest of the opening.

The bees came and went and were still bringing in a gold pollen that Ann said was from the ivy that grew on the sides of buildings nearby. It was very apparent to me that the things that I do and have learned to do with my hives, particularly in Winter, were not being done by these bees. The amount of air circulation going on in the tree hive must've been minimal. There was a bottom and top entrance but they were tiny. There was also no place for dead bees to be hauled out by workers. Of course, I did not know how big the hive was inside of the tree and how many bees were inside. The breed looked to be similar to a Carniolian. They were not aggressive with us and even though the temperature was below 57°F/13°C, they were still foraging.

As we walked back, we talked more about bees, and specifically about wintering. I mentioned to her that up where I live, there are some who kill their bees after the honey harvest, because they have been taught and they believe that bees can't be overwintered in the subarctic. She was shocked. This was also what I had been taught by my first teacher, but I was determined to find a way to do it and knew that just because it might not be being done in Alaska, didn't mean that it was being done in other countries around the world. This led me to gathering any research I could find on overwintering in areas that have Winters as severe as Interior Alaska. There wasn't much information available, and information on wintering as far South as Anchorage didn't apply because their Winter temperatures are closer to those of Montana, whereas ours are closer to Russia, Greenland and Finland. Gratefully, I was able to find information on overwintering that applied to us from a beekeeper in Yukon Territory, Canada. Because the Interior of Alaska is very much like a small town, word got out that I was looking for information and I was able to make contact with people in the area who had been successfully overwintering their bees both indoors and outdoors for many years. Indoors meant a root cellar, basement, a garage, a shed or some other structure they had built to keep their bees alive during the long Winter. Not many other people knew about these techniques that had been being used to overwinter honey bees for generations in the Interior of Alaska. I believe the information had not gotten around in part because of the lack of communication and lack of gatherings for beekeepers in our area. Before the Internet, information traveled through mail, phone calls, word-of-mouth etc. Now we have online forums. However, many of these old timers don't use the Internet and certainly are not

involved in any online forums. As a result, their knowledge is becoming lost. Their methods were originally brought from other countries like Russia, Germany and Finland and then adapted to Alaska by those who had enough curiosity and sense to realize that overwintering is not impossible here. Fortunately, the paradigm seems to be changing. I, and a handful of others, have been working to make the information on overwintering colonies available to anyone who wants to learn and we have been spreading the news widely.

In Alaska, regardless of if someone overwinters their bees or not, if someone wants to start an apiary, or replace lost colonies, they must order bees from a bee dealer. Since honey bees are not native to Alaska, the bees that Alaskans are able to get are shipped up from California, typically in four-pound boxes. We are not able to get nucs because of state regulations that are aimed at preventing the transmission of foul brood. According to our Department of Agriculture, more than 3,000 boxes come into Fairbanks alone, each Spring. This amount doesn't include Anchorage, Kenai, Palmer or any other area of the state. The cost of each box runs from $200.00-$250.00.

Some of the bee dealers offer classes in beekeeping in Alaska. Only one bee dealer teaches a beekeeping class that discusses overwintering and what they teach is that it's not worth it. The rest of the classes don't include information or resources on how to overwinter bees in our state. I am not a bee dealer and started teaching a class on overwintering in 2021. Because of our environment and climate, it is likely that we will have to keep importing four-pound boxes of bees until beekeeping becomes sustainable. That may be some years off, but not as long as some think due to climate change.

Alaska has been feeling the impact of climate change in big ways. Our Summers are now filled with wild fires. Ice flows are not as available for polar bears or walruses that need them as a place to rest and eat, so both are being found more inland. The growing season for gardeners in the Interior of Alaska has increased by a month in the past thirty years. So even though honey bees are not native to Alaska, I predict that in the next ten to fifteen years, we will see some wild honey bees in the far North. Interestingly, a few years ago honey bees were found to have hived up in a tree near Palmer, Alaska. Palmer is about 400 miles south of where I live. The colony must have been a swarm from someone's hive. It did not survive, but it had found a place where the bees thought they could survive. This past Summer, a swarm from a fellow beekeeper's hive set up in a nearby tree and drew out comb that was hidden by the tree leaves. It wasn't discovered until Autumn when the leaves fell off the tree. The bees where still amongst the combs but they had died in our frigid temperatures. These might be signs of our changing conditions.

Upon our return to Ann's house after visiting the bee tree, Ann introduced us to Cynthia, who is Ann's bee buddy. She keeps her hives at a local distillery. Cynthia was also kind and generous enough to take us to her apiary and show me her hives and talk about wintering bees. After that, we returned back to Ann's home for Scottish hospitality that included tea and some honey tasting. It had been an amazing day for which I am grateful. I am also grateful for the sharing of camaraderie, warmth and communication that happens between beekeepers from completely different areas. We are all enchanted by this magical creature. I would encourage any beekeeper who is fortunate to travel to different areas to look up beekeepers and request a visit. So many of our bees are vanishing for so many different reasons. Beekeepers sharing knowledge and supporting each other's efforts can only help towards the survival of all of us.

Lisa Hay is the Alaska Director for the Western Apicultural Society. She hosts *A Subarctic Beekeeper* podcast, as well as moderates two online beekeeping forums: the Alaskan and Subarctic beekeeper forum and the Interior and Northern Alaskan beekeeper forum. Lisa teaches classes on beekeeping in Alaska as well as a class on overwintering honey bees in the subarctic. She tends to her bees on her family-owned farm called Happy Creek Farm.

It wasn't what I expected to see; I sort of went into shock. Toppled boxes and scattered frames. I had just expected to check on what should have been queen right nucs. No, I finally experienced the bear.

The apiary, yesterday five colonies and half a dozen splits in progress, was at the foot of Muddy Creek Mountain and my friends up there had lost their bees to bears. My farmer host had seen a young one scamper down the creek near my hives a year ago. Was it luck or had my electric fence kept them away so far? The question now was, how did the fence fail now? But we'll deal with that later. There is work to do.

So, there are some lessons to learn here. For one, depending on the time of year, all is not lost. Late May, there is still time to convert some of the wreckage to splits, or should we call them smashes. Later in the year I might combine more bees into a larger reconstructed unit better able to prepare for Winter. Another option would be to put smaller colonies over a larger one with a double screen between. This would keep queens/workers of the respective colonies separate while allowing the upper one to take advantage of heat from the colony below. I have overwintered smaller colonies this way. It all depends on where the bees are in their annual cycle and what you have left to work with.

Now the salvage can seem overwhelming. But I've worked some in the emergency room and know that when the bad wreck comes in you can't just walk away. You ignore your feelings and go to work; you need to begin somewhere.

So, like contemplating my first move in our old childhood game of pickup sticks, I start to look through the toppled boxes and disheveled frames. For the moment, forget the scattered mess. Look where your remaining bees are.

Pooh Bear aside, bears are not after honey; they are after fats and protein, your uncapped brood. It is hard to believe that for much of the year a 500 pound black bear survives on ants, larva and the like.

If you are used to making splits, you know where to begin with reconstruction. If not. Here are some tips.

See where the bees are clustered. They will be most numerous on brood and on honey. Following those on brood is your best prospects for finding a queen, if you are lucky. If you find her, put that frame in the center of a nuc box or single box and build out a colony from there. The number of starts you try for depends on how many colonies have been damaged. I had three hives torn up, six nucs-in-progress mangled.

As I work, I realize my task is simplified since, years ago, I switched to using medium depth frames everywhere. No problem, since now any frame can be put anywhere.

There was a lot of nearly capped honey and a good bit of capped brood. The two queens I found went into nucs with the intent of keeping them portable and moving them quickly to another yard. There they could be expanded to a full box or two. As things progressed, I set aside a couple frames of nearly capped honey for extraction coming up soon (if the other two colonies don't get ripped up). Each start got either a queen or some eggs and young larva from the remaining colonies. Look for a frame or two of capped brood, a frame of pollen and also one or two of honey. The brood is important to offset the progressive attrition of your current workers and the twenty-one days required for a queen to raise up the first new workers. If you are putting in eggs and larva since you have no queen, you have another couple of weeks for a queen to hatch, mature, mate and start laying. Again, you need to start somewhere. Remember, though, to leave an empty frame either for your queen to lay or workers to store more nectar.

The frames that were rather full of honey but not capped, I sat at the end of the row in a box with a cover on top, out of the weather but available for robbing. I did not want to put it directly on top of one of the single boxes starts because it would make it too heavy to move alone. The wreckage with some honey value I left also out for robbing.

I see where Mr. Bear broke the bottom wire. Was the electric fence working? This is an out yard, so no 110 volts available. I use Parmak equipment and here was using an old 6-volt solar unit. Even if I had used the 12-volt larger model I still would have only generated a third of the joules available from a plug in unit to punch the bear. I had strengthened my fence a bit but

noted that the charger was working. But later, moving the bees after sundown, there was no discharge. That's the culprit here. Either the battery was shot or simply not charged up since the solar panel had not been in proper position.

Luckily, I was able to get some charge from my host's pasture fence nearby. Enough? I am not sure, but there was nothing to be done that evening.

Oh, Bear; don't despair

Zack Comeaux

Intending a move, before I left the yard this afternoon, I screwed down the inner covers on the single boxes and taped the side cracks under the lid of the nucs. Returning this evening I stuffed the entrances with steel wool and off we went. Too late, too dark, too tired, I will leave the bees in the pick up under the cap tonight and set them out in the morning, at home.

It was a long day. Now, ten in the evening I am typing away after going back to pick up the starts in the late light. But I feel like I made the most of the situation.

Sometimes keeping bees is like managing a checking account. You need to keep making deposits (raising new queens/colonies) if you expect to make withdrawals. Today the lesson is that beekeeping is like the stock market; it has its ups and downs.

Some lessons learned, I am going to bed.

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THE DARBY BEE ESCAPE: SIMPLE, CHEAP AND EFFECTIVE

Peter Sieling

In the early twentieth century, J.E. Crane wrote a series of articles *in Gleanings in Bee Culture* on his experiences as an American foulbrood inspector. While visiting A.W. Darby's apiary in Alburgh, Vermont, he saw a device for clearing bees out of honey supers that was simpler and less expensive than the Porter bee escape[1]. It works on a similar principle to escape boards except that the bees exit to the outside of the hive and then find their way down to the entrance. According to Crane, "It makes the best kind of escape… We have tested it and it works perfectly."

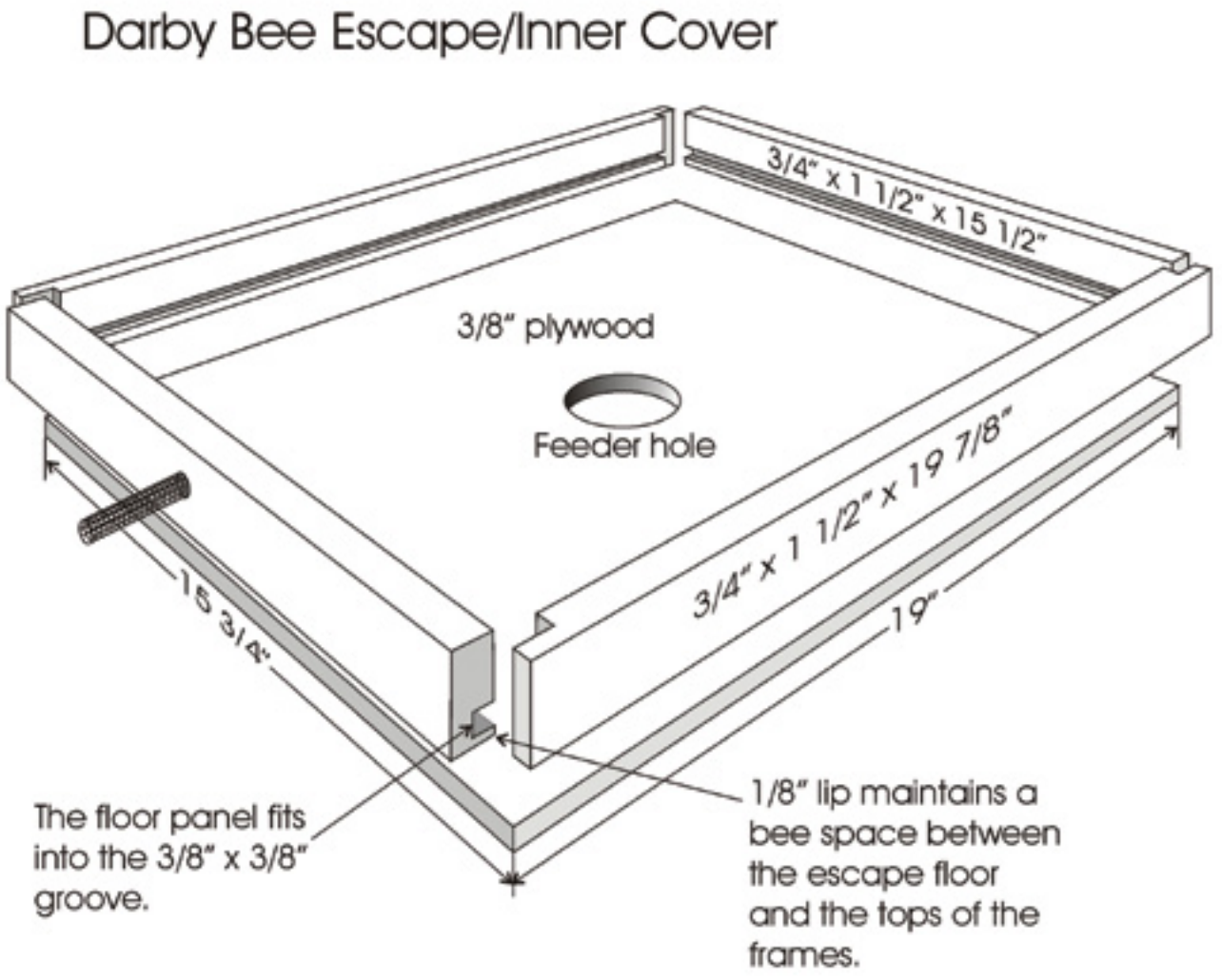
Darby's bee escape was soon forgotten, but it looked so simple, I made several. They worked for me as well as an escape board, plus you can watch the bees exiting the supers.

A.W. Darby used his bee escapes as an inner cover, leaving them on the hives year-round. They had a floor with a feeder hole. A quilt provided insulation both Summer and Winter. The bees exited the supers through a three inch long by ⅜" diameter hardware cloth tube. The escape hole without the hardware cloth tube provided ventilation and an upper exit.

I made several escapes to use in place of inner covers. I used ¾"-thick poplar for the rails. The panel could be ¼ or ⅜"-thick plywood. I used ⅜" tongue and groove poplar because I could make it faster than driving to the building supply center. Kiln dried lumber will expand in width so the panel needs space to expand in the groove. Using ¼" or ⅜" plywood would be easier because it is dimensionally stable. I made the rails 1½" in height to make space for one inch foam insulation above the panel and ⅛" lip underneath to keep the bee space between the top bars of the frames and the escape board.

To use the escape, remove the honey supers. Cover the feeder hole with anything that works—for example, a jar lid or a wood block. After an hour or two, you will see a steady parade of bees exiting through the tube. As

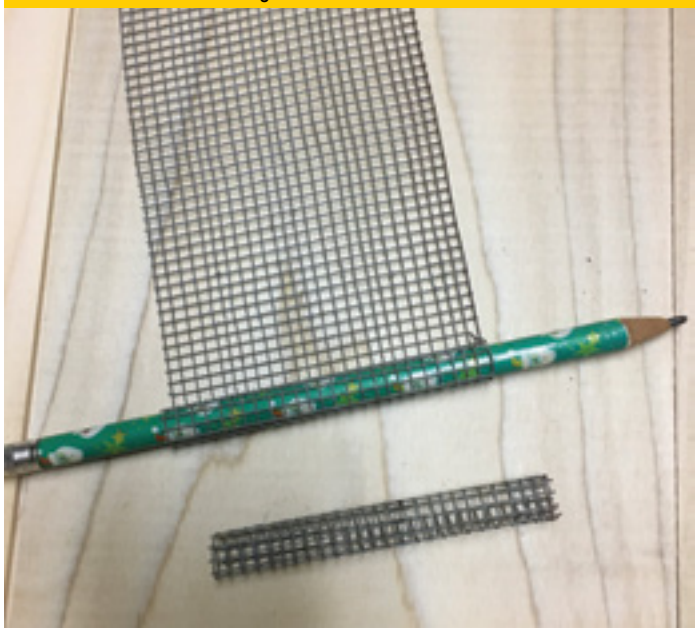
[1]Porter bee escapes are still available from bee supply catalogs but some have dropped the name Porter, calling them just bee escapes. They are inserted into the oblong hole of the inner cover.



Bees exiting the supers.

Unassembled parts of the bee escape.

Rolling the hardware cloth tube.



Hive shim on top of the inner cover.

with other bee escapes, the supers need to be bee proof to prevent robbing. Robbers try to enter at the base of the tube rather than the end. In 24 to 48, hours the supers will be almost empty of bees.

An even simpler Bee Escape

The easiest, fastest and cheapest version of the bee escape uses an inner cover, a hive shim and the hardware cloth tube. The hive shim is available in bee supply catalogs, but they are easy to make. It's a frame, about 1"-wide with the same outside dimensions as a bee hive—19⅞" x 16¼" for a ten frame hive. Drill a hole in the front to fit the tube. After removing the honey supers, put the inner cover back. Cover the feeder hole, add the hive shim with the tube facing to the front and add the supers and the cover.

Conclusion

After the Fall harvest I stacked the wet supers above inner covers so the bees could clean them out. The bees wouldn't abandon the empty supers even on cold mornings. I made half a dozen escape boards and put them under the supers in the mid-afternoon. An hour later you could watch the bees leaving. By 9:00 am the next morning approximately 90% of the bees had exited... After taking off the supers, I removed the tube, inverted the bee escapes, put a one inch insulation board on top and replaced the telescoping cover.

Like the Porter escape, the Darby escape can clog. The advantage over Porter escapes is you can see the clog without removing the supers. The Darby escape board works best when the weather is warm.

About the author
Peter Sieling is a wood technologist and beekeeper in Bath, NY.

Salivating over Salvia

Alyssum Flowers

Salvia is the largest genus of plants in the sage family (the mints, Family Laminaceae) with over 1000 species of annuals, perennials and shrubs, which true to their family, are easy to grow and relatively drought and heat tolerant. The word "salvia" is derived from Latin *salvia* (sage), meaning safe, secure and healthy. Two well known species in the family are common sage (*Salvia officinalis*) and rosemary (*Salvia rosmarinus).* Needless to say, the leaves and flower parts from salvias have been used for medicinal and herbal remedies for generations.

Salvias offer a wide selection of colors, sizes, leaf textures and functions in the garden and are all highly attractive to bees, butterflies and other pollinators. Their leaves are aromatic and can be planted as edging in a garden, mixed into an ornamental bed, sprinkled in with annuals or highlighted in a pollinator garden, all with spectacular results. Flower colors range from white and light lavender, to purple, fuchsia, red, pink, yellow and several shades of blue.

Some of the favorite annual cultivars are bedding salvia (*Salvia splendens*) that come in bright fire engine red, purples, blue and white, reaching 12-24 inches, and can be pinched back for season long color; and Mexican Bush Sage (*Salvia leucantha*), an annual with soft foliage, non-stop purple and white or pure purple flowers which bloom from Summer until frost and are favored by butterflies and hummingbirds. Many more perennials are available such as Brazilian Blue Sage (*Salvia guaranitica*) which reaches five feet tall and flowers all Summer, attracting many species of butterflies as well as moths and hummingbirds, and Wood sage (Salvia x sylvestris), which is a cross between *S. nemorosa* and *S. pratensis*; a slender leafed variety with spikes of blue tightly clustered flowers that will continue to bloom from May to frost. The vigorous plants grow 18-24" tall and will thicken if the spent flower heads are pinched. These plants prefer full sun but are still attractive in partial sun.

A. I. Root has two varieties in their garden, Salvia Bumblesnow and *Salvia nemorosa.* Marcus. S. Bumblesnow is a compact pure white flowering delight that can be planted toward the front of the garden, as it only reaches 10" tall, spreading about a foot. True to its name, it is highly attractive to bumble bees as well as other bees, many butterflies, skippers, hummingbirds and other nectar seekers.

Salvia Bumblesnow
https://www.waltersgardens.com/variety.php?ID=SALBN

Salvia nemorosa Marcus is a compact, bushy plant that forms mounds of grey-green leaves, with spikes of violet blue flowers in early Summer, and is also attractive to butterflies, bees and hummingbirds. It grows eight to 12 inches and is a favorite in cottage and pollinator gardens.

Most salvias are easy to grow and can be split to produce more plants. They can take average fertility in well drained soils from Zones three to nine and are deer and rabbit resistant. With so many species and cultivars to chose from, any grower can select many kinds for their garden to bring season-long variety, color and interest to their yard.

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Salvia splendens

Brazilian Blue Sage *(Salvia guaranitica)*
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REMEMBERING EUGENE "GENE" KILLION

Charles and Karen Nielsen Lorence

If you have been around long enough in the beekeeping industry, the name Gene Killion not only rings a bell but it also inspires awe. Gene passed away on June 19, 2022 at the age of 98. With his perennial humor, Gene claimed he was (two years younger than) a centenarian and had been keeping bees since he was five years old. Gene's family was a member of the American Beekeeping Federation since its inception. His father, Carl Killion, began the stellar bee hive inspection program in the State of Illinois and, in 1971, Gene took over from his father. He remained on the staff until 1990 when he retired. Fifty plus years had passed since the inspection program had begun! At the height of the program, he oversaw about ten inspectors. All the pioneers in the industry were Carl and Gene's friends.

Gene was in the U.S. Air Force during World War II. When he left, he sold his honey to his father for 5¢ a pound and his father forewarned him, "Someday you will be selling your honey for $1.00 a pound." Again, the Killions were on the cutting edge when they began selling pollen traps, were the first to sell pollen supplements and packaged their honey in plastic. They were the first to have a stainless steel extractor from A. I. Root.

The specialty of the Killion family was section box comb honey. They had a very unique method of production and produced thousands of sections which were sold around the nation. The highlight came in 1951 when they broke the all-time record by averaging fourteen comb honey supers each from 100 hives. One hive actually produced seventeen supers. The small town of Paris, Illinois was not even aware of it as the honey would be shipped out of town within the confines of a semi.

Each year in October, HONEY WEEK is celebrated in Paris, Illinois. This commemorates the anniversary of the issuing of a bee stamp in 1980. Gene's father Carl worked tirelessly with the U.S. post office, as did Gene, as his father aged. The Killion family has always been a well respected family in Paris, IL and continued to impact the beekeeping industry in the United States.

In the late 1940's, Gene studied under Dr. Bert Martin of Michigan State University to enable him to be a judge of honey. Over the years, Gene was the chief judge of many national honey shows, writing several articles on how to judge honey exhibits.

With this fine history behind him, it was in 2016 that Gene was attending the American Beekeeping Federation convention in Ponte Vedra, Florida. There he was giving a presentation and met the chef. They became fast friends and Gene helped to make Sawgrass Marriott more natural-food oriented.

A cute story that was remembered by Gene is when his father, Carl, built a camper truck to drive to the bee convention down in New Orleans at the Roosevelt Hotel. It just so happened that the major league baseball convention was being held at the same time. Needless to say, Gene and his brother were mesmerized by meeting many of the ball players and getting their autographs rather than going to the bee meetings with their mom and dad.

Gene is survived by his son Mark in Paris, Illinois. Condolences can be sent to *P.O. Box 96, Paris, IL 61944.*

THE IMPRECISE PRECISION OF BEEKEEPING

Hey beekeepers, it's perfectly normal

Beekeepers slowly grow to accept the obvious

If you read any bee book, beekeeping is made to look precise – predictable. In reality, it is anything but. Through the passing decades, innumerable times, new beekeepers have plaintively cried to me (and you), *"I put on the supers, but they didn't use them." "I removed the cork, but the bees still have not released the queen from that little cage thingy." "I put on a feeder, but the bees didn't take the syrup."* Or *"I put on another brood chamber, but they still swarmed."*

Bee management is not precise. It never was. When we are new beekeepers, we try to treat the craft with precision, but we are continually rebuffed by the bees and the decisions that they make on their own. The book says, *"Do these things, in this order, and your bees will be fine – most of the time."* Over time, the ever-evolving beekeeper begins to accept the ambiguity of the craft. Whatever common management procedure that we are doing is probably the right thing to do – *most of the time*. Our general management recommendations are always *best guesses*. They always have been.

But still, we never miss an opportunity

Colonies on scales

But we never miss an opportunity to try to add some precision to our management systems. Scale colonies and their related apps are a great example. You can tell a lot from what is happening with a colony that is on weight scales. Scale colonies' data yields actual numbers. You can tell when a nectar flow is ongoing and when surplus honey is being stored. But you are only recording what happened either by natural forces or by bees making their own survival decisions. We're not really controlling anything. *"Well, it was a cold, wet Spring this year. The bees are late." "Humm, clover is in full bloom. Why are the bees not putting up more crop?"*

In this case, data gathered from the scale colony helps us improve our future guesses – but they are still just numerical estimations. Just so you know, I heartedly support the use of scale colonies or other weighing devices on some of our colonies. Even though they are still estimations, over time, scale weight data significantly improved our ability to predict and schedule future management events.

Requeen regularly

Change the queen on a regular basis. Yeah, right! That's in every general bee book seemingly ever published. It's a common recommendation made by authors who will not be paying for the replacement queens or installing them. Even so, the perpetual recommendation has been to *requeen every other year*. Apparently, the prevailing opinion is that a new queen will not swarm during her first year on the job, and the bees will not be superseding during the nectar flow[1].

So, do you see? As bee managers, we try to get ahead of this swarming/superseding thing by *requeening every other year*. In *textbook beekeeping*, the replaceable queen is probably already doing a marginal job and needs to be replaced. In yet other *textbook beekeeping* worlds, queens are readily available and are affordable. Importantly, in the perfect world of *textbook beekeeping*, hypothetically, I am an accomplished bee colony manager, and I am able to perform this queen-replacement event with confidence and certainty. So, do you see? We put a specific time interval on queen events – events that are very unpredictable. The book said to do it. So there, we do it.

Replace combs every *three* years

I put the *three-year* stipulation in the opening header to this section. Some authorities' guesses are every five years while other pundits offer the classic *"as needed"* designation. In my earliest bee years, I was taught that combs could be used indefinitely. In my bee classes, I was told that there were combs at Cornell University that were thirty-five to forty years old. They would be even older now.

My first beekeeping professor told my class that the beauty of managed beekeeping procedures was that more honey could be produced because the bees were required to produce less wax. It made beautiful sense – or so it seemed. Finally, here was something in beekeeping management with no time designation.

At the time I was being taught this irrefutable fact of comb refilling, I would drink an occasional *Coca Cola* from a six-ounce *"returnable"* bottle. That soda bottle reuse procedure is one that many current younger people know nothing about. There was an entire infrastructure for returning the bottle to the bottler

[1]Personally, I have commonly had late season swarms from packages or splits that outgrew their brood nest areas. I am reasonably comfortable writing that if the brood area is consistently crowded, even a first year queen cannot suppress the swarming characteristic within the colony. In earlier articles, I whimsically referred to these late swarms as suicide swarms. They had no chance of surviving the upcoming Winter. But oddly, the parent colony was going to face extreme challenges, too, in getting the new queen mated so late in the season. I offer the comment here that these late season swarms are truly bad for the general survival of both the swarm and the parent colony. Why would a colony do this?

and having it subsequently refilled. If you wanted to take the bottle with you, you paid a few cents for it. You then owned the bottle and could sell it back later – for a few cents.

This returnable soda bottle procedure was frequently compared to beekeepers returning wax combs to awaiting bees. Returning combs to the bees for refilling was just like glass bottles that were being returned to soda companies for refilling. Yet today, most beekeepers are still returning combs to the bees, but they now drink from *disposable* bottles or cans. Is the lifetime of reusable wax combs truly opened ended? Is it time for us to stop reusing beeswax combs so long?

Well, how long should combs be used? *Oh, I don't know – maybe three to five years or just replace "as needed."* I'm back to where I started on this subject. I promise that I don't mean to annoy anyone who is reading this, but my combs come and go with just common usage. No doubt I have some that are too old, but alternatively, I have recycled combs that only had a couple of years use when they were retired. There are all kinds of reasons that a comb is retired other than toxic compound accumulation. Some examples are wax moth damage, comb disease, mouse damage, top bar pulled off or aberrant comb construction[2].

Bottom line here is that there are no clear rules for something as simple as wax comb replacement. You, the beekeeper, must deal with the indecisiveness of the issue. It's just another example of the imprecision of beekeeping.

Hey, the nectar flow is going strong – or not

Beekeepers, why is it that so many available blossoms, on beautiful Spring days, have not a single bee – of any species – anywhere near them? I wince when I hear how dramatically the overall insect population has declined. I can readily observe the *"bug"* population decline by the significantly reduced insect population at the outdoor light on my back deck or on the windshield of my truck after a drive to a distant bee yard. I have written in previous articles about the thousands of lightening bugs in my backyard in the 1970s but now my yard only supports a few hundred. Time and again, I read that *"Something must be done about the insect decline!"*

So, I participated in *No-Mow-May*, and I did not cut my grass (or spray) for most of May. I had dandelion blooms that were approaching ten inches tall, and I had them by the thousands. I had eight hives just a few yards away, but what I did not have was foraging bees on these dandelions. With no science nor accurate counts, I roughly estimated that there was one honey bee – frequently a pollen collector – per approximately five-hundred blooms. By the time you read this, this season's clover crop will have bloomed and gone, but for me, I am still anticipating it. I can guarantee you that my upcoming clover honey crop – just like the dandelion bloom – will be disappointing. These two plants, and many others, are listed as major food plants for bees. If they are so lucrative, why are there so few insect visitors on these plants' blooms?

Figure 1. A proactive homeowner helping insect pollinators.

Previous experience, the annual calendar and data from scale hives, are three cues that will have alerted me to the coming of the seasonal nectar crops. Predictably, clover blooms will be like dandelion blooms – thousands of blooms and only a few hardworking foragers. In the imprecise world of beekeeping, I will feel that there has not been enough rain – or alternatively – too much rain. Maybe it has been too cool, or something is off with my fertilizer application. Could be the wrong variety of clover – and the classic – there's always next year.

Books and information sources will correctly list the *"approximate"* blooming dates for the plants my bees love. Please help me here – am I totally wrong? I have not seen the classic nectar flow filling new combs in a couple of decades. I'm remembering those nectar flows of old when beautiful, new combs were seemingly drawn overnight. I'm remembering when I removed a new, snow-white comb frame from the super and turned it horizontal for a better look – and I would have copious amounts of water-thin nectar rain on my shoes.

Don't get me completely wrong. I still get some honey from my bees, but I tell you truly that I have not seen abundant, thin nectar in my colonies in many years. Is this only happening in my immediate area? I fear that this is just my modern,

Figure 2. Why do so many dandelion blooms NOT have pollinators visiting?

[2]A beekeeper friend of mine likes these old, dark combs for use in swarm trap boxes. He feels that these old combs are highly attractive to homeless bee swarms.

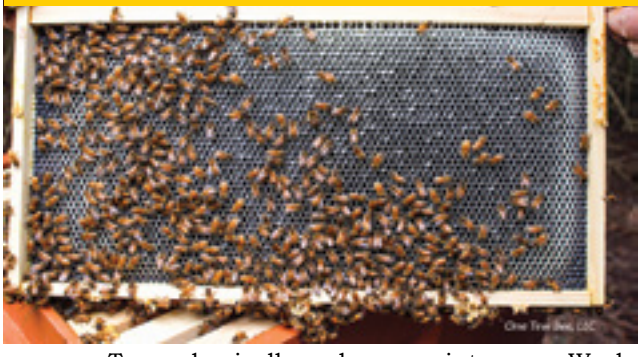
weed-free, Midwestern corn, wheat and soybean ecosystem. The roads and lawns here are also weed controlled, so this occurrence may just be my lot. If you still get the stereotypic, intensive nectar flow, I would enjoy your correspondence on the subject – if only for me to reminisce.

The very opposite aspect of this imprecise discussion – honey bee precision

While much of bee management recommendations may not be precise, many aspects of honey bee biology are stunningly precise – stunning. For instance, the orientation mathematics that bees use is… *may I use the word again…* stunning.

Frankly readers, this will be a short discussion section because the bees' inborn ability to calculate, orient and construct are far beyond my ability to expound and discuss. For instance, scout bees leading the hoard to the new home site. How do they do that? That lone water forager bee that can find the tiny amount of water leaking from my water hose and then send others to it. How do they do that? The precision with which bee construction workers can build new hexagonal combs or how bees that are essentially blind in the dark can so easily find the successful forager that is presenting a mathematical grid (the dance) to direct recruits to the new home site or to a food source. Again, how do they do that? This *Astounding List* of bee innate abilities is nearly endless[3].

Figure 3. Look beyond basic bee management to the complex biology and mathematics quietly shown in this photo.



To academically make my point, I offer a note[4] presented several years ago in *Discover Magazine,* and then I offer a second reference[5] that refutes the concepts of the researcher's original comments made in the magazine article. This academic interaction is beyond the scope of my present article, but this advanced discussion touches on the complexity of the bees' natural ability that they use in their currently unexplained world.

This esoteric discussion in the technical beekeeping literature clearly makes the point that, *"We don't know what we don't know."* I have made no serious effort to explore all avenues of this ongoing interaction that presents advanced concepts in honey bee mathematics and quantum physics – if such a type of mathematics and quantum physics even exists.

The imprecise precision of beekeeping

I speculate that our myriad questions and odd events in beekeeping are because our true understanding of honey bees and their ways is presently only at the elemental level.

Yes, it's true. All of us are only beginner beekeepers – some more than others.

I can't even tell you why Summer bees perform the washboard behavior or if forager bees know the existence of neighboring colonies so they can rob from them if the need arises. How do bees find water sources – by smell? If so, it must be a very powerful sense they have for I have had them find very small water sources. How do scouts find new home sites? Sight? Compared to my vision senses, what does the world look like to flying bees? Questions seem endless.

From intellectually afar, it would appear that bees, indeed, do have a remarkably precise lifestyle. This lifestyle only appears imprecise to us – humans – because we are still learning and exploring the tools and abilities that bees have that are fully foreign to us. We have only begun to understand.

Thanks for reading

Thank you for reading this piece. I always appreciate your time, but more importantly, thank you for thinking.

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https://www.honeybeeobscura.com/ Honey Bee Obscura podcast

https://youtu.be/3MOFqQjNtdA

[3]In fairness, it should be said that many, many life forms possess novel behaviors and abilities – not just honey bees. But again, in fairness, honey bees are the life form that we are presently discussing.

[4]Frank, Adam. October 1997. *Discover Magazine*. Quantum Honey Bees. **https://www.discovermagazine.com/planet-earth/quantum-honeybees**

[5]Shelomi, Matan. **https://www.quora.com/What-is-the-current-state-of-research-on-Barbara-Shipmans-findings-regarding-Quantum-Mechanics-and-the-Honey-Bee-waggle-dance**

Best Bread

Shana Archibald

Ingredients

- ☐ 2 cups warm water (105-115°F degrees)
- ☐ 1 tablespoon active dry yeast
- ☐ ¼ cup honey
- ☐ 2 teaspoons salt
- ☐ 2 tablespoons oil (canola or vegetable)
- ☐ 4-5½ cups all-purpose or bread flour

Directions

Step 1
Prepare the dough: In a large bowl or stand mixer, add the yeast, water and a pinch of honey (¼ teaspoon). Allow to rest for 5-10 minutes until foaming and bubbly. (This is called "proofing." If it doesn't foam, the yeast is no good, and you need to start over with fresh yeast)

Step 2
Add remaining honey, salt, oil and 3 cups of flour. Mix to combine.

Step 3
Add another cup of flour and mix to combine.

Step 4
With the mixer running, add more flour, ½ cup at a time, until the dough begins to pull away from the sides of the bowl. The dough should be smooth and elastic, and slightly stick to a clean finger, but not be overly sticky. Add a little more flour, if needed.

Step 5
Knead the Dough: Mix the dough for 4-5 minutes on medium speed (or knead with hands on a lightly floured surface for 5-8 minutes).

Step 6
First Rise: Grease a large bowl with oil or cooking spray and place the dough inside, turning to coat.

Step 7
Cover with a dish towel or plastic wrap and allow to rise in a warm place until doubled in size, about 1½ hours.

Step 8
Spray two 9x5" bread pans with cooking spray on all sides. (I also like to line the bottom of the pans with a small piece of parchment or wax paper, but that is optional)

Step 9
Punch the dough down well to remove any air bubbles.

Step 10
Divide into two equal portions.

Step 11
Shape each ball into long logs and place into greased loaf pans.

Step 12
Second Rise: Spray two pieces of plastic wrap with cooking spray and lay them gently over the pans.

Step 13
Allow dough to rise again for 45 minutes to one hour, or until risen 1 inch above the loaf pans.

Step 14
Gently remove covering.

Step 15
Bake: Preheat oven to 350°F.

Step 16
Bake bread for about 30-33 minutes, or until golden brown on top.

Step 17
Give the top of a loaf a gentle tap; it should sound hollow.

Step 18
Invert the loaves onto a wire cooking rack.

Step 19
Brush the tops with butter and allow to cool for at least 10 minutes before slicing.

Step 20
Once cool, store in an airtight container or bag for 2-3 days at room temperature, or up to 7 days in the refrigerator.

CALENDAR

♦MISSOURI♦

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

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

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

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

♦NEW YORK♦

EAS is having their 2022 Conference *Beeing Social, Again* at Ithaca College in Ithaca, NY on August 1-5.

A short course will be offered from Monday to Wednesday. The main conference will be Wednesday through Friday. A roster of excellent speakers is being assembled including Dr. Tom Seeley, Mike Palmer, and Dr. Dave Tarpy.

Details will be forthcoming on the Conference Page of the EAS Website: **easternapiculture.org**

♦TEXAS♦

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

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

Registration opens in August.

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

New on www.BeeCulture.com

There is a new Calendar section on the website. All of the events you see here are listed online with details, addresses (for easy access) and links. Go to www.BeeCulture.com/calendar-of-events/

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Image Contest - Splitting Colonies

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

How To Submit:

Email your images to **Emma@BeeCulture.com**
Use the subject "**Image Gallery**"
Please include in your email:
- 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.

Doctors keep quitting on me. Two retired, one took an administrative position, another moved to India. Yet another doesn't accept Medicare. My most recent quitter decided to specialize in vasectomies. I don't need one. Only the no-Medicare doc bothered to inform me prior to dropping me as a patient.

So I'm continually looking for a doctor. My new one ordered up some tests to help determine which old-man medicines I need.

The diminutive lab tech who drew my blood was all tattooed up and very easy on the eyes behind her COVID mask. She might have been Hmong. We got to talking. Hiking in Texas, she got too close to an Africanized bee colony, taking a dozen stings as she sprinted down the trail and leaped headlong into the river. "Now I'm scared of bees," she confided.

I told her my little darlings are very gentle and would never chase anyone into the river.

The gal Marilyn and I hosted the backyard barbecue for the Colorado Beekeepers' Summer meeting. That redhead Tina showed up at the farm a day early to help with the setup. On her last visit from Durango she drove her '94 Volvo wagon. This time it was an '88 Dodge Raider.

It looked like a sweet little rig, certainly classier than the wrecked '98 Saturn or some of the other automotive relics residing at Colby Farm.

Marilyn and I drive beaters, so I didn't give it a second thought when Tina headed down the road in her Raider to pick up Dr. Juliana Rangel, our meeting speaker, at the Grand Junction airport. The temperature was in the mid-nineties, and Tina later confessed to driving "about 85 with the air conditioner on."

After she gassed up a mile from the airport, her Raider wouldn't start, so Dr. Rangel rented a car at the airport, picked up Tina, and drove the two of them to Colby Farm. They both stayed in the idyllic studio behind the house. Tina and I pulled out the orchard sprayer the night before. Not everyone stores an orchard sprayer in their guest house, but for once the place was squeaky clean. I did ask Tina beforehand if she didn't think Juliana might be more comfortable in a private motel room. She assured me that bee speakers appreciate it when you open up your home and don't abandon them to a lonely night at the Holiday Inn.

So those girls made it back, but the Raider was still broke down over an hour away in Grand Junction. We were thinking vapor lock, a generally hot-weather condition that can resolve itself after an hour or so. Cousin Hal lives close by, and when he came to the rescue that evening, the Raider started right up.

This is exactly how my beekeeping operation runs. Stuff breaks or wears out or gets left behind, I improvise and life goes on. This is normal. Take today. At one of my high country yards, I dropped off some one-storey hives for comb honey production. I worked for a few hours. The battery on the solar electric bear fence charger wasn't putting out, so I replaced it with a spare I'd luckily brought along. But when I turned the key in my truck to leave, all I got was a click. I'd neglected to turn off my headlights. I disconnected that battery I'd just hooked up to the fence charger, hauled it over to the truck, and dug out the jumper cables behind the seat. Voila! On the road again.

That darling Cori buys my honey for her restaurant in Silt. I try to return the favor. You scratch my back… The other day a new server took my order. She couldn't have been nicer. Afterwards on my way back from Paul's honey house, it hit me – I'd forgotten to leave a tip. This was criminal.

When I returned with dollar bills and an apology, she laughed it off. Stoney was still holding court at his table. He took it all in. "If you'd have stiffed me, I'd have thrown your coffee cup at you!" he declared.

You have to tip everybody these days. There was a mix-up, and it looked like the outdoor toilet might arrive late at the aforementioned backyard barbecue. Felix, a good-natured Chicano dude with knuckle tattoos like in the barrio, came down from Aspen at the 11th hour and set up a charming little commode in the shade of a plum tree. When he picked it up after the weekend, I complimented him on the exceptional service. I was going to give him a jar of honey but somehow got sidetracked. Then he was gone. He left the gate open, just to remind me that "Great service, no tip" doesn't cut it. Now I have to track him down.

Tina was going to go fishing with me after the meeting but used her car breakdown as an excuse to back out. Maybe that wasn't the real reason. She admitted she felt swamped by bee projects. I get that. She's in some ways like me and does her best work when she's under the gun. I did give her fly casting lessons in the yard. That was as close as we got to the water.

As she headed for home I cautioned her to keep it under 85. But first we made a bet. A certain thing has to happen in the next 12 months, and if it does, or it doesn't, one of us has to drive to the other's house and work for a day.

I'll fix her. When she comes back to pay up, I'll make her go fishing.

Ed Colby

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