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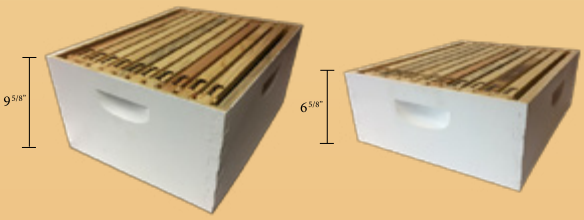

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A beautiful Summer beeyard. Photo by Nina Bagley.

In Beekeeping, Timing is Everything

A Devastating Discovery

It started in October, his bees were absconding. Discovering colony loss is heartbreaking, no matter how many years you've been beekeeping. When beekeeping is your business, this loss has an all-too-real impact on the future of your company and family. That's what Peter Chorabik was faced with two years ago when his Ontario colonies were cut in half, lost to the devastating Varroa mite.

A Timely Wake Up Call

For years, Peter's go-to treatment was multiple applications of oxalic acid in the fall, which kept losses around 30% — an acceptable reality for his business and region. When his apiaries were hit hard by Varroa mites two years ago, he spent some time rethinking his treatment plan. Peter recalls working with oxalic acid, "Something always seemed to be going wrong." Despite being a cheaper product upfront, Peter often faced unexpected costs and unavoidable delays. He needed to rebuild, but also find a more reliable Varroa treatment that would ensure further growth for his apiaries.

He turned to *Formic Pro*, adding a mid-summer treatment of this all-natural product made with formic acid that targets Varroa mites where they reproduce, under the brood cap. This results in higher efficacy rates compared to oxalic acid, which only kills phoretic or dispersal phase mites found on adult bees. Plus, the ready-to-use strips meant *Formic Pro* would be a dependable, scalable application solution.

Commercial Apiaries Can't Afford Setbacks

As viruses compound, it becomes even more critical to get mite loads under control before the winter brood is produced. In Peter's case, waiting to treat with oxalic acid until after his honey harvest was too little, too late. By adding *Formic Pro* to his treatment plan, he was able to safely treat during the summer honey flow to ensure the bees hatching in early fall are healthy. This more flexible and effective treatment properly protects and prepares his colonies for winter.

"We had 30% more honey because the bees overwintered better."

Bouncing Back

Just two years after his heartbreaking discovery, their apiaries have bounced back to more than 500 colonies. Peter is proud to report an overall survival rate of 84% this past winter after using *Formic Pro*. He consults his records, "We had 30% more honey because the bees overwintered better." Going into spring with stronger bees, Peter looks forward to even more productivity from his hives this year.

In 2012, Peter Chorabik began his beekeeping venture with just two hives. After some hard work, he and his wife, Sarah Allinson-Chorabik, turned those hobby hives into a commercial operation with 500 colonies. They now run two full-time businesses: *Toronto Bee Rescue* and *Ontario Honey Creations*.

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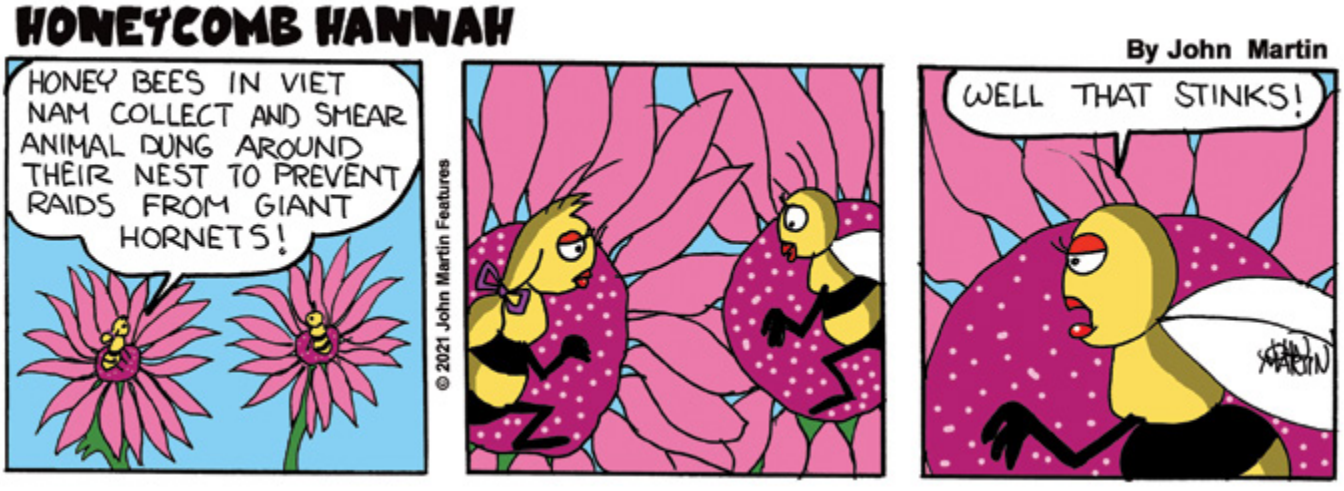

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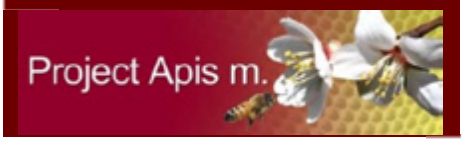

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From The Editor –

This past weekend (May 15th) I had the opportunity to take a short driving trip to present to the Northeastern Indiana Beekeepers Association for my first in-person Beekeepers meeting in about 18 months. For this whole COVID lock down in-person meetings of all kinds have been cancelled or limited to number of attendees. So this is where Zoom rose to the top and filled in the in-person gap – kind of. These digital distance meetings are much better than no meeting or just a conference call. And you can see those people who actually turn on their video for a Zoom. But if they don't, you get the black box with the person's name at the bottom of the box. You can mute yourself so there is no background noise and add your comments to the 'Chat' box to have a conversation. It's all OK.

This past weekend I was in a room with about 110 Beekeepers, with NO Masks – I could actually hear a real voice, not a muffled one – Smiles – Chatter – I had my first handshake in months and months – people coming up to you after your presentation to ask more questions or tell you their story. It was a marvelous, wonderful, social Beekeeper gathering. The Northeast Indiana Beekeepers were Great.

I sure hope it continues – I Love Beekeepers.

As I write this 3,230,000 deaths have been recorded worldwide from COVID. Our Health Care System was tested and overwhelmed at times. We all have been working from home if we kept our jobs, social distancing for months and wearing masks to protect us individually from serious exposure to the COVID virus. We all have been washing our hands more and are much more aware of the people, places and things around us in our family, work and community life. We have been very aware of travel issues. The airlines can attest to loosing 100's of millions of dollars as business and personal travel came to a screeching halt. Many of us have had the one shot or the two shot COVID vaccines – but not all of us have. For those who have gotten their shots they have been told to keep their little vaccination cards as documentation as travel, business, restaurant, sports events, concerts etc. may be restricted to those having the 'card'. Many countries are experiencing their 2nd or 3rd wave of lockdowns. And, we have been told that with the Fall and Winter approaching shortly the impact of COVID may reappear in significant ways.

Billions of dollars have been freely given to control COVID safely on our behalf.

Livestock of all kinds can get diseases. The one that has gotten the most attention in the last couple years is African Swine Fever (ASF). Half the World's Pigs Are Facing the Largest Animal Disease Outbreak in History. In the U.S. you can't just load up a truck full of chickens, pigs, cows, rabbits etc. and take them to another state legally. There are Livestock Animal Movement and Importation Laws, Reportable and Foreign Animal Diseases, biological and Risk Management and Biosecurity and Animal Programs, Licenses and Permits in each State which the State Veterinarian oversees. All this because if livestock is moved around and the animals have a disease, that disease is transported with them to infect another animal.

Here is a listing of some Animal Diseases – Anthrax, Avian Influenza and Newcastle Disease, Bluetongue Brucellosis, Bovine Spongiform Encephalopathy (BSE), Chronic Wasting Disease (CWD) Contagious Equine Metritis (CEM), COVID-19, *Coxiella burnetii* (Q Fever), Epizootic Hemorrhagic Disease Equine Encephalitides (EEE, WEE), Equine Herpes Virus, Equine Infectious Anemia, Equine Piroplasmosis, Equine Viral Arteritis, Fowl Typhoid (*Salmonella gallinarum*) Infectious laryngotracheitis, Johne's Disease *Leptospirosis* (canine), Malignant Catarrhal Fever, Mycoplasma (*gallisepticum* and *synoviae*) Plague, Psittacosis Pseudorabies, Rabbit Hemorrhagic Disease Rabies, Salmonella (*pullorum* or *enteritidis*), Scabies (cattle or sheep), Scrapie, Tuberculosis, Tularemia, Vesicular Diseases, Vesicular Stomatitis, West Nile Virus.

Billions of Dollars have been freely given to control livestock diseases in order to feed us safely

Now, here is a listing of some of the main Honey Bee Diseases.

Acariasis, *Acarapis woodi*, Parasitic Varroatosis, *Varroa destructor,* Parasitic Aethinosis, *Aethina Tumida* (Small hive beetle), Parasitic Tropilaelapsosis, *Tropilaelaps* spp., Parasitic, American foulbrood, *Paenibacillus larvae*, Bacterial European foulbrood, *Melissococcus pluton*, Bacterial Chalkbrood, *Ascosphera apis*, Fungal Stonebrood, *Aspergillus flavus*, Fungal Nosemosis, *Nosema apis* – *Nosema ceranae*, Fungal Amebiasis *Malpighamoeba mellificae*, Protozoal Sacbrood Virus (SBV), *Virus Picorna-like,* Viral Chronic Bee Paralysis Virus (CBPV) *Cripaviridae*, Viral Acute Bee Paralysis Virus (ABPV) *Dicistroviridae*, Viral Deformed Wing Virus (DWV) *Iflaviridae*, Viral Black Queen Cell Virus (BQCV) *Dicistroviridae*, Viral Israeli Acute Paralisysis, *Virus* (IAPV) *Dicistroviridae*, Viral Kashmir Bee Virus (KBV), *Dicistroviridae*, Viral Kakugo Virus *Iflaviridae*, Viral Invertrebrate Iridescent Virus type 6, *Iridoviridae*, Viral Tobacco ringspot virus *Secoviridae*.

And let's not forget Small Hive Beetles (SHB) as a secondary predator.

Have Billions of Dollars been freely given to control Honey Bee Parasites, Pests and Diseases?

The main interstate movement for Packages, Nucs, Splits, Queens is mostly over for producers in a

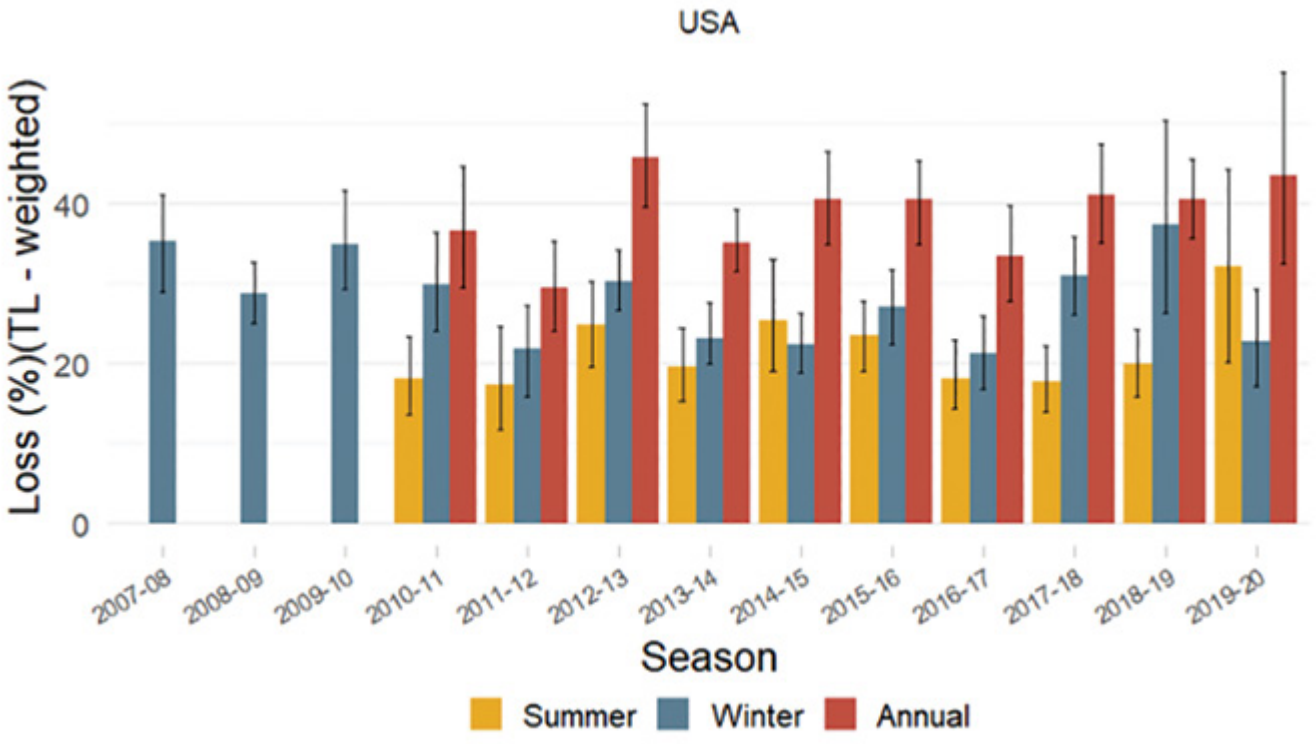
multitude of States. Hundreds of thousands of each were produced, shipped in bulk, picked up by beekeeping supply distributors and local regional beekeepers for themselves and local customers. We don't even know how many. Where is the oversight of distributing 100s of thousands of these across the United States? Do all states have a Apiary Inspection system to look at and certify each Package or Nuc or Queen? Should they? Or, is it OK to mix parasites, pathogens, pests from all over the U.S.? I guess if our honey bees were evolved enough to handle these negative and deadly health inputs it wouldn't make a difference. But, they are not immune or resistant.

We have been losing approximately 40% of honey bee colonies per year for decades. Do we as a beekeeping industry need help, assistance, collaboration from our tax dollars? At the end of the day it is all about money unfortunately. Some States have excellent Apiary Inspection programs and some don't care enough. The AIA (Apiary Inspectors of America) is an organization that represents the State Apiary Inspectors who do an excellent job with the minimum resources they have been allotted. The AIA shares information and data and does an superb job of trying to help the Beekeeping Industry at all levels. But, they need your help and support. If the cattle industry lost 40% of all the cattle each year, or 40% of all hogs or chickens or turkeys or – those in charge of tax dollars would be stumbling over themselves to fix the problem. Your honey bees contribute almost $20 Billion Dollars of economic value simply from the crops they pollinate. Then think of the economic value in the 2.5 mile radius environment around your colonies that honey bees visit to pollinate plants, trees, bushes that produce seeds so they can reproduce plus feed squirrels, birds, deer, possums, turkeys and on and on. But 40% of the honey bees die each year. This is not a good economic, environmental or business model.

We Beekeepers have a tendency to not be confrontational and go with the Flow. But, in this case the Flow may take us over the Water Fall together. And when we go a lot of Good things go with us for these wonderful Environmental Samplers we have a passion for. We can have loud voices but one loud voice doesn't do it. Support you State Apiary program and go to Apiary Inspectors of America, **https://apiaryinspectors.org/** to connect. If you have a loud voice or want to practice yours go to a listing of Representatives and Senators at **https://www.govtrack.us/congress/members/current**. The 'squeaky wheel' gets the grease. Your State Association should be listening and you should already be a member. The American Beekeeping Federation is active for you, **https://www.abfnet.org/** along with the American Honey Producers Assoc., **https://www.ahpanet.com/**. Visit the Honey Bee Health Coalition site if you haven't already, **https://honeybeehealthcoalition.org/**. All this to say anybody who says they can do something Positive alone is a liar. The only way good things get done is when we work together.

We need more positive, pro-active attention given to Honey Bees and their Keepers.

Take a look at the BIP Losses Graph below. BC



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It's Summers Time –

Some Random Thoughts –

I had a hard time settling on things to talk about this month. It seems like there is so much going on in our little world and out there in the big world also. I hope this finds you all enjoying the Summer – whatever that means in your world.

Here in *Bee Culture* land we have some exciting things happening. First of all on May 22 our Amanda welcomed her sweet little Liliana to the family and to our *Bee Culture* family. We can't wait to meet her. She scared mom and dad a little when she first got here and had to spend a couple of extra days in the hospital but she's doing great now. You can see by big brother Anthony's face, he's very happy to welcome her to the family.

As a result of Liliana's arrival Amanda gets to spend the Summer with her family and we are so happy for her. We've always appreciated all that Amanda does for *Bee Culture* – but we appreciate her even more now that she's not here. Jerry, Jean and I will do our best to keep things going until Amanda gets back.

It's hard to believe that 2021 is half over, but here we are in the July issue. But the future is looking brighter – beekeepers and others are starting to gather in person again. ZOOM has been a wonderful tool to get us through this time. Lots of folks were able to attend meetings that they otherwise woulnd't have. Costs of speakers and travel and time away from home and work – we didn't have to deal with these things. But nothing beats being together in person. Being back at work, back at church, gathering with family and friends is the greatest thing.

Here at *Bee Culture* we've got some exciting things coming up. On a mostly local level we're starting up our Bee Talk sessions again. I think it was Kim that came up with the idea maybe two years ago. We open the doors to our big meeting room here at Root on the 2nd Monday of the month and we just talk about bees. There's no business meeting, there's no president, there's no dues – there's not even coffee. Somebody's got a question – it gets answered, sometimes with three different answers. You know how beekeepers are. Folks loved it and missed it for this past year or so. Think about doing this in your area. It's great fun!

Also, looking forward to October we are making plans for our annual event. I think this will be year seven or eight. We had a great plan for last year and we're going with that same plan for this year. Take a look at page 52 for the details. We'd love to have a bunch of you here in person. Northeast Ohio is lovely in the Fall and you get to visit the Root Factory and see where we make it all happen. Sign up soon so we can be ready for you.

I know some of you are way ahead of us with gardens and flowers and plants. But this morning I was greeted by the first lilies popping by the back door. We'd been watching the buds for several days knowing it would be soon. The iris have been blooming for awhile. And in a short time period we had black locust, catalpa, and tulip poplar blooming. Happy bees!

I do a lot of reading and have gotten some new ideas to try this Summer. One idea right here in *Bee Culture*. Take a look at Jessica Louque's article. I'll definitely be taking some old supers and making raised beds out of them. I also saw where someone had taken cement blocks and stacked them in different configurations to make raised beds - some brightly painted, some not.

Kim and I are also starting a project that I've wanted to do for several years – our tiny orchard. Fruit trees are kept small by pruning and are easy to manage – no ladders, no 40 bushels of something, just enough fruit to enjoy. So far we have apples (you have to have apples), plums, peaches and persimmons. I don't know anything about persimmons – I don't think I've ever eaten a persimmon. Stay tuned – we'll let you know how it progresses.

If you're yard is anything like ours there's always something that needs doing. We have a little over two acres and as I ride along on my mower I'm constantly making a mental of list of what needs to be attended to. We won't live long enough to do all the things we want to, but the fun is in the trying and working on a new project all of the time.

I hope you are enjoying your Summer. See you soon!

Kathy Summers

NEXT MONTH

Region 1
- Remove Honey Supers
- Sample for Mites
- Treat for Mites if needed during dearth
- Equalize hives
- Sell Late Nucs
- Check Queen Status
- Mow Yards
- Monitor mites/Alcohol Wash
- Add more Supers for Fall Honey
- Install Screened Bottom Boards
- Re-Queen
- Harvest Honey

Region 2
- Alcohol Wash, Sample for Mites
- Treat for mites if sample is over three per 100 bees
- Make Fall Splits
- Check Food supply after Dearth
- Harvest Honey
- Check for Queen laying pattern
- Mow Yards
- Re-Queen those needing it
- Check for SHB

Region 3
- Harvest Honey
- Sample for Mites and Treat then Sample again
- Add Supers for Fall Flow
- Remove Comb Older than three years
- Check for SHB
- Make Fall Splits
- Re-Queen

Region 4
- Pull Honey
- Feed for Winter
- Monitor for Mites with Alcohol Wash
- Treat for mites if Alcohol Wash shows three mites or more per 100 bees
- Equalize Colonies
- Keep Supering
- Monitor SHB
- Mite Control! Know the Numbers. Do not Guess!
- Re-Queen

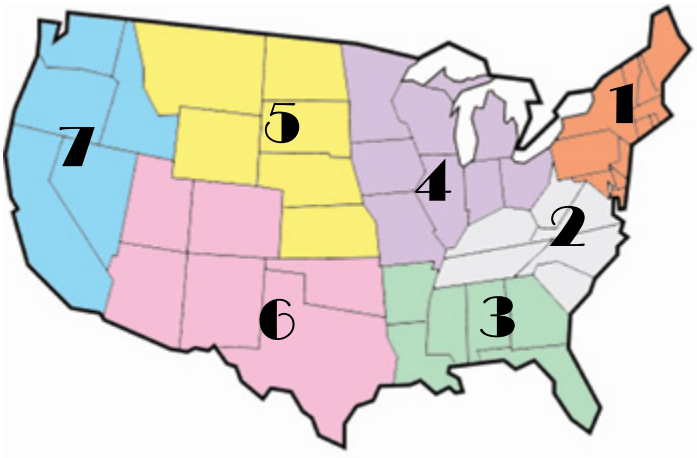
Region 5
- Monitor and Treat for Mites
- Feed syrup for Winter as necessary
- Monitor for Mites. Treat for Mites
- Check Honey Stores
- Pull Honey
- Check Queen Laying Pattern

Region 6
- Alcohol Wash for Mites
- Treat After Alcohol Wash if needed
- Feed
- Leave Fall Honey on colonies
- Make sure you have enough Honey Jars
- Mites, Mites, Mites
- Provide a consistent water source

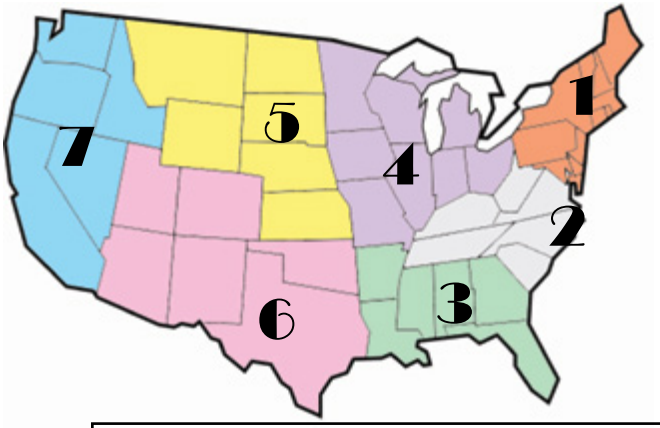
Region 7
- Make a clean water source
- Add Honey Supers for Fall Flow
- Harvest Summer Honey
- Sample Mite Loads and Treat if necessary
- Re-Queen
- Check and Control mites (Try)
- Watch Out for lawn care Spraying

Honey Reporters Wanted

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



JULY – REGIONAL HONEY PRICE REPORT



	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7				Last	Last
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								**Range**	**Avg.**	**$/lb**	**Month**	**Year**
55 Gal. Drum, Light	2.03	2.23	2.42	2.19	2.38	2.07	2.63	1.65-3.25	2.25	2.25	2.23	2.16
55 Gal. Drum, Ambr	1.93	2.16	2.18	2.12	2.39	1.95	2.55	1.50-3.25	2.15	2.15	2.14	2.05
60# Light (retail)	220.00	201.00	198.75	183.15	170.00	142.18	212.50	80.00-290.00	198.09	3.30	198.7	205.01
60# Amber (retail)	221.25	193.75	191.25	179.95	195.59	151.38	245.80	80.00-300.00	201.18	3.35	193.46	204.24
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	87.46	75.70	96.00	75.50	120.00	91.04	91.04	66.00-126.00	86.09	7.17	99.36	88.80
1# 24/case	150.44	128.57	120.08	93.85	152.50	94.92	144.00	45.00-284.00	128.36	5.35	142.91	138.65
2# 12/case	128.64	99.45	108.80	94.32	76.22	102.00	264.00	40.60-264.00	118.06	4.92	118.81	120.67
12.oz. Plas. 24/cs	116.58	137.85	100.00	83.72	83.76	101.88	108.00	48.00-244.00	106.15	5.90	106.96	99.56
5# 6/case	144.24	116.00	129.45	102.70	113.16	105.00	129.45	71.50-192.00	127.15	4.24	133.44	139.25
Quarts 12/case	161.09	169.00	143.25	108.94	164.47	155.94	183.00	109.20-231.00	152.00	4.22	160.11	151.80
Pints 12/case	100.74	122.28	80.33	84.56	101.37	109.00	96.00	60.00-192.00	99.84	5.55	96.21	95.91
RETAIL SHELF PRICES												
1/2#	5.45	5.33	4.88	4.45	3.87	2.19	8.00	2.19-9.00	5.16	10.31	5.44	5.18
12 oz. Plastic	7.09	6.52	5.47	5.37	4.83	5.96	7.20	3.49-12.00	6.19	8.26	6.29	6.16
1# Glass/Plastic	8.84	8.70	7.43	6.74	7.92	6.87	10.50	4.49-16.00	8.21	8.21	8.30	8.13
2# Glass/Plastic	14.63	13.44	13.19	10.98	13.21	9.99	18.00	6.98-25.00	13.70	6.85	13.54	14.29
Pint	11.56	11.30	8.07	11.23	9.83	12.75	12.30	4.00-22.00	10.84	7.23	11.08	11.20
Quart	20.88	19.07	22.59	15.75	17.45	16.74	22.37	8.00-75.00	19.42	6.47	18.80	18.14
5# Glass/Plastic	32.03	25.00	37.50	24.00	25.25	27.96	57.50	15.00-65.00	30.46	6.09	29.27	29.05
1# Cream	9.72	8.38	8.00	7.75	10.00	10.50	14.00	5.02-18.00	9.50	9.50	9.38	10.66
1# Cut Comb	13.40	12.10	9.75	11.05	12.00	13.35	10.00	7.00-22.00	12.19	12.19	12.63	13.00
Ross Round	9.79	7.00	10.20	12.50	12.00	10.20	13.75	7.00-16.80	10.27	13.69	10.71	10.77
Wholesale Wax (Lt)	6.91	6.24	6.07	6.43	6.40	4.00	10.25	2.00-15.00	6.71	-	6.75	6.56
Wholesale Wax (Dk)	5.85	5.69	5.41	4.33	7.10	3.00	15.00	2.00-15.00	5.71	-	6.16	5.51
Pollination Fee/Col.	87.27	71.00	56.67	97.50	140.00	94.29	38.33	15.00-200.00	81.07	-	88.29	87.17

Some regulations to consider if you want to import honey to resell – NOT THAT WE WANT YOU TO DO THIS

Before you can get in on this $333.5 million-dollar industry, you're going to need to understand the laws and regulations for importing honey into the U.S. in the first place. The Food and Drug Administration (FDA) is the federal government agency in charge of regulating imports of food products into the United States, including honey.

There are several things that you will need to do before you can import honey. The first thing is food facility registration. Any facility that is involved with the harvest, creation, storage, packing, or transportation of imported food products must be registered with the FDA before you send your shipment to the border. If your supplier isn't already registered, you will need to make sure they register all their facilities with the FDA.

Once that is done, you'll also need to make sure your supplier has implemented a Hazard Analysis and Critical Control Point (HACCP) plan, which is a plan for identifying, monitoring, and preventing hazards within the facility to ensure food safety.

Finally, you will need to alert Customs and Border Protection (CBP) when your shipment of food will be reaching the border, so they can prepare to receive it accordingly. This prior notice requirement is important for making sure your import is inspected and handled quickly, so it doesn't spoil.

Looking to import bees or beeswax? You'll have some additional requirements you'll need to meet. Check out our article Importing Bees and Beeswax to the U.S. for more information.

Packed Honey Labeling Requirements

The United States Department of Agriculture (USDA) requires the following on its honey labels to pass import inspection:

- A grade, sampling or continuous inspection mark
- The country of origin
- Words that are legible and in English
- The words "Product of," followed by the country where the honey came fromThe common name of the product ("Honey" in this case)
- The net weight of the package
- The ingredients (Which should be only honey, since it doesn't require any preservatives or additives)
- The country of origin
- The contact information of the shipper, manufacturer, farmer, packager, or distributor

Sometimes, producers will dilute their honey with water or corn syrup, then try to sell it like it's pure honey. They can stretch their honey supply and make more money, but this is illegal. Failing to report all of the ingredients in a package of food can have serious consequences, and you can be sure your import isn't getting through customs. This practice is known as "honey laundering."

It is your responsibility to ensure that your supplier's labels are true and accurate, and that the honey you are imported is pure. Failure to label your honey shipments properly will result in their seizure and destruction. You may even face legal repercussions.

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Technology Tips For Beekeepers

Malcolm T. Sanford

RF DOPPLER SENSOR FOR ASSESSING BEEHIVE HEALTH

Herbert M. Aumann; University of Maine; USA; herb@mainebiosensors

This sensor should be of interest to commercial beekeepers as well as the armchair beekeepers who want to unobtrusively monitor the health and productivity of remote beehives with a smartphone. The sensor is small and requires no disassembly or modifications of a hive. The sensor is based on a low-cost, low-power 24 GHz Doppler radar module that is commonly used in automobile collision avoidance systems. With some modifications, it is capable of detecting honeybees in flight at a short distance. The output of the Doppler sensor is an electronic signal the 0 to 800 Hz frequency range. Beehive health and productivity are assessed by monitoring the flying activity of bees arriving at and departing from the hive entrance and comparing it with the activity in front of other hives. To reduce the large volume of data to a single meaningful index, the activity level is quantified by the average root-mean-square (RMS) power in the Doppler spectrum. This index is collected every 2 minutes during daylight hours and transmitted to a central node by a wireless network. Data from three instrumented beehives collected during the summers of 2018 and 2019 are presented. The activity indices were found to be highly correlated with environmental effects, such as temperature and solar radiation. They were also indicators alerting the beekeeper to immediate intervention, such as hive failure, absconding, swarming, and robbing. The technique was validated by comparison with visual hive inspections.
14 minutes https://tinyurl.com/hujz3s

OPEN-SOURCE MONITORING PLATFORM BEEP DEVELOPMENT IN B-GOOD PROJECT

Marten Schoonman; BEEP Foundation, Netherlands; marten@beep.nl

BEEP is based in The Netherlands and provides open source tools to beekeepers to help them keep honey bee colonies healthy. The BEEP platform consists of a responsive web application and a digital hive monitoring system. The BEEP app is a digital colony management logbook in which one can register inspections and access sensor data from the BEEP base or another (hive monitoring) device via API interfacing. Its main strength is the standardized data categorization with over 600 items that the beekeeper or bee researcher can select from to organize their data collection. The BEEP base measures weight, temperature, and sound of the bee colony. More sensors can be added, and the app code and base designs and firmware are open source available. The custom PCB is designed to be as energy efficient as possible and uses LoRa data connectivity. The BEEP platform is further developed into a decision-making support tool for honeybee health in the B-GOOD research project. 8 minutes https://tinyurl.com/k2syvkmz

TECHNOLOGIES FOR POLLINATOR SURVEILLANCE IN FIELD STUDIES AND INTELLIGENT IMAGE RECOGNITION: RFID, RANA, AND DAISY-II

Sarah E. Barlow; University of Utah, USA; and School of Natural and Environmental Sciences, Newcastle University, UK; sarah.barlow@redbutte.utah.edu; and Mark A. O'Neill; Tumbling Dice Ltd, UK; mao@tumblingdice.co.uk

https://beekeep.info/vita_details/

Ecologists and beekeepers need technology-based solutions, or e-ecology tools, for acquiring, sharing, and understanding data on pollinators to address urgent knowledge gaps. We will present our work on developing and applying three novel technologies for studying pollinators: these are 1) prototype long-range RFID tags for tracking bumblebees in the field; 2) an automated video monitoring system based on active motion vision, called Rana; and 3) a deep learning intelligent image recognition system based on plastic self-organizing maps, called DAISY-II. We envisage an integrated e-ecology platform that leverages these, and other, tools. Developing the next generation of e-ecology tools will require cross-disciplinary collaborations between ecologists, engineers, informaticians and beekeepers, and significant investment from academia and industry. 14 minutes https://tinyurl.com/4yjdes75

STUDY HALL

Brood Breaks and Queen Rearing Classes

Q – *As each day passes, I become more convinced that breaking the brood cycle is one way to manage issues in the colony. With that said, I would like to study queen rearing. My question to you is: if time, money and distance were not considered, where would you go to queen rearing school and hands-on experience in the world?*

Thanks for tolerating me! I am very passionate about having the healthiest bees around and achieving a ridiculous goal of 100% survival rate each year or said another way; zero colony loss. Don't laugh-out-loud too much. Blessings, Richard

A – I do not know that a 'brood break' is the 'silver bullet'. In some case it can help I am sure but if you have individual workers, drones, and the Queen that are carriers of X parasite and disease a brood break doesn't stop anything when the brood break is over.

Talking to commercial beekeepers when they have hundreds of colonies that are declining from supposed 'virus' negative health issues they sequester colonies in isolated yards, aggressively treat for *Varroa*, feed, feed, feed and the term they use is 'wash out' the virus which may take 12-18 months. Meaning they wait for new bees over several generations to be produced that have not been impacted by the *Varroa*/*Varroa* Virus legacy.

With our COVID change of life plans I do not know the status of the below, but worth a check.

https://www.beelab.umn.edu/bee-squad/education/beekeeping-classes/queen-rearing
https://extension.entm.purdue.edu/beehive/short-courses/
Artificial Insemination – **http://www.honeybeeinsemination.com/about-us.html**

Queen Rearing

Q – *Greetings Jerry, Typically I raise my new queens (OTS (on the spot) method) in June/July, so as to go into the winter with young vigorous queens. However, in Maryland, our main nectar flow is over by then. Knowing that is easer to raise queens, make new nucs and splits while there is a flow going on, I'm thinking of removing the old queen about three weeks before the flow tapers off. The logic is that any brood that would have been raised beyond this time, wouldn't be mature in time to contribute to gathering nectar anyway and the new queen larvae will be feed well, as the flow is still ongoing.*

Are there any cons to this thinking, that you are aware of? For example would the now queenless hive reduce their efforts to bring in nectar or ripen it? Thanks for any advice you may have. Bill

A – So, my question is why are you concerned about nectar flow when you can feed them sugar syrup? Commercial Queen breeders don't care what the flower nectar flow is because they are creating their own by using 'sugar syrup' feeding. Let me know so I can see how you are thinking about this.

Bill, with the new queens, I will make some new colonies (as well as requeening my established hives). I find that I struggle with new (weaker) nucs getting robbed out by the established colonies. I put robber screens on the nucs and keep the syrup inside a second box but inevitably some get robbed. I'm then forced to move them to another location, which is doable but a bigger pain to go feed.

So the thought is, if I do it before the dearth gets bad, the nucs will be strong enough to better defend their reduced entrances and I won't have to move them to another yard. Also, they will have more time to build up to a full size colony and thereby able to ride out a cold winter a bit better, due to a larger cluster.

That said, I likely wouldn't do this, if it means the queenless hives get lethargic and don't keep up their nectar storage.

Please feel free to shoot holes in this, if it doesn't make sense.

This is what mine look like Bill.

Your plan/idea is certainly possible but it requires some degree of 'guessing' which means sometimes you are right and sometimes you are wrong. Eliminate the 'guessing' if you can by managing where you can to control the outcome.

Jerry

I see your point Jerry. Two questions:

1. Is it your understanding/experience that a hive made queenless during a flow tends to "work less hard" or not really?
2. It looks like your entrance hole is half way up the front wall on your nucs. What is the reason for this?

Bill

Honey Bees are always preparing for 'Winter.' And when you make them Queenless/ie. No Queen pheromone they are really, really concerned that this will cause their demise and cancel out their ability to survive and pass on their genetics. They get even more active in foraging. Years ago there was a comb

honey producer in central Illinois. They would take Queens out of their 100's of colonies when Soybeans bloomed. This would activate those colonies to collect much more nectar and build much more comb. This was a successful business decision for them.

I didn't want entrances at the bottom that were hard to reduce or cover up when I wanted to move the nucs. The entrances are about quarter/25 cents size. Easier to cover with screen when moving.

What do you think?

Jerry

Thanks for the helpful info Jerry. I think I need to do some experimenting with a few hives, to see what works better for me/here.

I break most of my overwintered hives down and sell the resulting nucs. As I like honey, I do try to keep a couple hives for honey. However, I've been more focused on raising bees over the past few years. Now looking forward to trying to increase my honey in my few honey hives. Thanks for the quick responses and the good discussion.

Bill

Remember Bill this is not Beekeeping, this is livestock breeding management, and you are the manager.

Jerry

Package bee Feeder Holes

Q – *Take a close look at my poor quality photos. Two holes and rather small. What is the minimum diameter of a honey bees mouth parts that would allow feeding? Doesn't look like more than one bee at a time could feed if it could access the syrup. In a three-lb package I'm not sure that is enough.*

My question this morning. Thank you, Larry.

A – Yes, holes too small to allow enough bees to feed and then share with their sisters. Heavy sugar syrup with these tiny holes is had to access by the bees. Package bee suppliers are in between a rock and a hard place as they don't want big holes that will leak in shipment and still be able to keep the bees in the package alive. But these few and tiny holes are going to kill a lot of packages before they can get installed.

North American
Mite-A-Thon
August 14-29, 2021

Grab your mite checking supplies and download the MiteCheck App for the Summer session of the 2021 #MiteAThon! You can participate by submitting your mite counts through the app!

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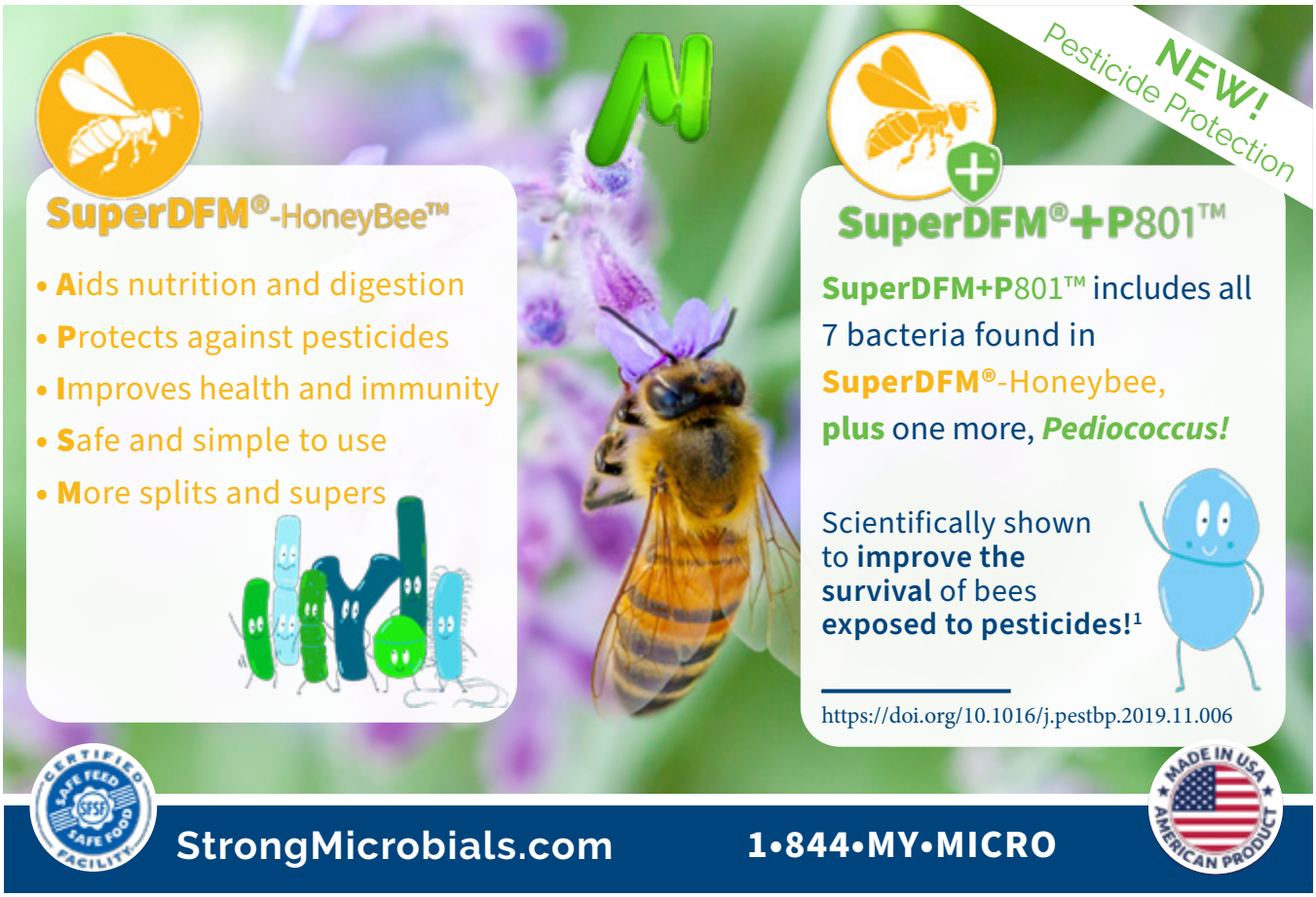

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New Summer Reading –

The Secret Life Of Bees. Moira Butterfield, author, and Vivian Mineker, Illustrator. Published by Quarto Publishing, 2021. ISBN 978 0 7112 6051 1. 9.5" x 11", 48 pgs., color throughout. Hard cover, $19.95.

Follow Buzzwing the honey bee on an unforgettable journey as she reveals all the secrets of the busy, buzzing world she lives in. This delightful children's book has 22 stories that are each a two-page spread, or maybe they could be chapters, that tell 22 different things about the secret life of bees. It begins with Buzzwing being born, and in two pages follows her life from an egg to a grub to a cleaning bee, to making honey ad wax, being a guard and finally a forager. She meets other workers, the queen, and drones, the bee dads, along the way. Another two page spread features All About Me, being hairy and stripy, having antennae and a long tongue, so that after looking at all the parts and pieces of Buzzwing, you will know what each of these does for her.

Throughout the book, there are stories about fables, the bee tale from Greece, Telling The Bees, The Boy Who Ate Sky Honey and several more. These fables, and that's what they are, give a depth to a children's book I've seldom seen and the illustrations that accompany them are excellent. With each two page spread there is a question at the end, down at the bottom, having nothing to do with the story on the pages. Rather, each page has many drawings - plants, animals, flowers, other bees, meadows and wooded places, that a bee would encounter outside on any given day. That question at the bottom though is clever. It asks the readers to find the two small rabbits hiding on the story's pages, or a turtle, or any number of animals carefully hidden in plain sight on the page. It is a grand and well used treat for parent and child to work together to find those animals.

More stories tell of the dance, swarming, the many thousands of other kinds of bees, what animals steal honey and of course all about honey. Some look at bees living in caves and cities, all about beekeepers and what they do, and finally the Winter snuggle-up.

It finishes all this with a page on how to be a honey bee's friend. You should grow flowers, make seed bombs, leave sticks and scrap wood in a small pile in the garden for the bees who live that way, and certainly, don't pick the flowers.

Buzzwing closes with "Bees make the world a sweeter place, so plant for us, grow the seeds, the plants and the trees, and we'll give you back a world of flowers, and some golden honey." *Kim Flottum*

Swarm Management with Checkerboarding, by John White, Anita Hunt and Gil Bannister. Published by Northern Bee Books in the UK, **www.NorthernBeeBooks.co.uk**. ISBN 978 1 912271 86 3. 8.5" x 6.5", 30 pgs. Color Throughout. Softcover. $13.95 on Amazon.

You probably don't remember Walt Wright, the NASA Engineer who after retirement turned his attention to beekeeping, and tried to figure out why bees swarmed, and why beekeepers couldn't do something about it that would stop them from swarming. In the late 1990s and early 2000s he wrote extensively in both journals about his observations, and over time developed and explained his techniques. He started with something called Checkerboarding, which was a way to provide both room for a colony to

expand and room to continue storing honey. Eventually, it turned into a technique he called nectar management, which included swarm control and honey production.

Basically, checkerboarding is placing supers with both full and empty frames above a full super of honey which sits on the brood nest box. Only one broodnest box. This gives the bees enough food to grow, but also enough space to store additional honey, all the while feeling right at home because of all the honey the beekeeper moved above them.

The timing sort of depends on your location, but essentially during the Fall the colony is arranged in a single deep box with honey, brood and some empty frames with a full super of honey above it. Then in very early Spring, the beekeeper adds a super and takes the honey frames from the overwintered super and spaces alternately in the original super and the newly added super. This is called checkerboarding. The excellent diagrams in this book make this very easy to follow. As the season progresses, the brood will move upwards because there is both food and room above them, and the beekeeper keeps adding supers, spreading out the honey already collected, leaving empty space and honey above the bees at all times. To keep the piles of boxes from becoming too tall, extra full supers can be removed occasionally.

The biology makes sense from a bee's perspective – there's always both room and food above us, so we don't need to swarm because we ha-

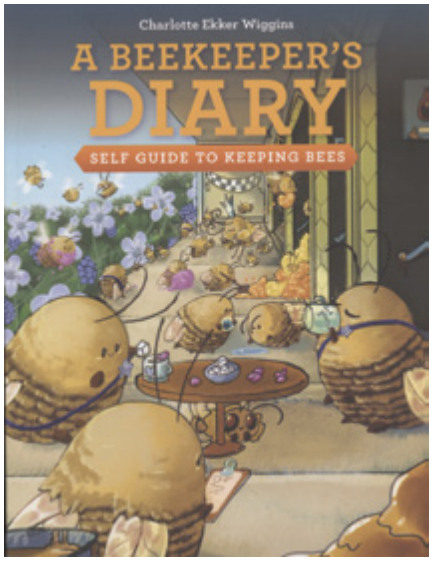
ven't run out of either.

This book does a good job of showing diagrams on how and when to do all these management activities. I think every beekeeper should be aware of the biology called into play here to both satisfy the bees, and, perhaps, make a good crop of honey. If you don't mind the work and have enough boxes. *Kim Flottum*

A Beekeeper's Diary. Self Guide To Keeping Bees. Charlotte Ekker Wiggins. ISBN 978-1-7357319-0-2. Self published, 2021. 8.5" x 11", 295 pgs. Black and white, soft cover. Available from the author at **www.CharlotteEkkerWiggins.com**, or Amazon. $34.95.

This book is exactly what it says it is. It's an information source on getting started as a beekeeper, with loads of checklists on every topic and blank pages for notes and it covers basically all the topics a beginner is going to need. And the most common answer to almost every question a beginner has is....It Depends. Because it does. And because it does, the author will cover all the answers that a question can bring up. Explaining that simple, but confusing, conundrum goes a long way in making learning about bees, beekeeping, honey and the rest a lot easier. Or at least it takes much of the confusion off the table.

Charlotte is also the author of Bee Club Basics, Or How To Start A Bee Club, so she is keenly aware of the issues of teaching new beekeepers and how to manage all the issues of teachers, mentors, students, classes and the like.



This book starts right at the beginning by offering a checklist of Why do you want to keep bees anyway? Then it goes into if just maybe helping bees is the goal, maybe just planting some good pollinator plants would satisfy that urge, before you spend a lot of money and time. I thought that was good advice.

But if you do, there are the basics. Starting with Langstroth equipment is a good idea because there is a ton of information out there about bees in these hives. But others exist, certainly. Then, bee suits, gloves, all about smokers and fuel and lighting them, and neighbor etiquette. And the basics of honey bee anatomy, biology, life cycles, and feeding. Next, where and how and when do you get bees, the containers they come in, queens, swarms, overwintering, and yes, sometimes bees die.

The basics of pests and diseases are covered, along with basic honey bee health. A good bit on how to do an inspection, and check lists and blank pages for what you saw and what it means. And there is a first-year calendar for what to do every month, and something not often seen, the same for the second-year. Lots and lots on honey has it's own chapter, too.

And then she does something I've not seen in a beginner's book before. You know the old story about asking three beekeepers a question and getting five answers. She takes you down each of those trails to find out why there are five answers. It seems, at least sometimes, that there are five answers, all coming from a different background, experience and purpose of keeping bees from those who answered. Sometimes there can be very fundamental disagreements here, and she very carefully explains how to defuse situations that can arise, and even destroy friendships, or even clubs.

Throughout the book there are scattered Good To Know Tips, which cover whatever topic the chapter is covering from a somewhat different perspective. For instance, buying used equipment is an option, but a few questions need to be asked first. The glossary at the end is 15 pages long, and covers about anything you need to know, and there's a short resources list, too. As said earlier, a highlight of this book is that there are lots and lots of check lists so you don't forget something, and lots of pages to put your own notes on for next time. All good tools to have.

Kim Flottum

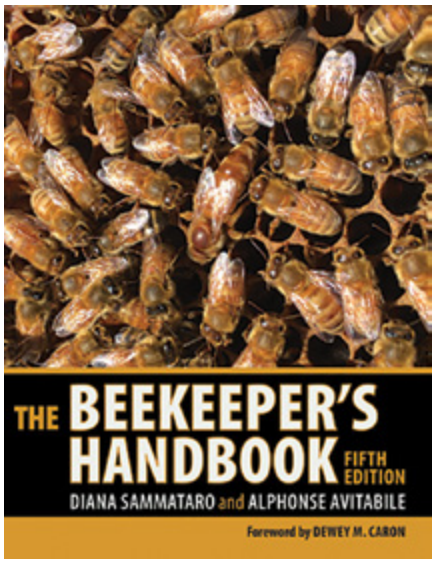
The Beekeeper's Handbook 5th Edition by Diana Sammataro and Alphonse Avitibile. Published by Comstock Publishing Associates (Cornell University Press_ Ithaca, NY. ISBN – 13: 978-1501752612. 368 pages softcover. 8.5 x 11 inches. $29.95. Available wherever books are sold.

The book many have using to learn beekeeping just got better. Diana Sammataro and Alphonse Avitabile have revised *The Beekeeper's Handbook*. You will find the 5th edition to be just as helpful and useful as the 4th when it was released 10 years ago.

Beekeeping is different things to different people. The 5th edition promises to continue to be a major resource for flattening the learning curve for beginning beekeepers. But experienced beekeepers too will find much to appreciate in the Handbook. Whether you are looking to become more successful or merely want to expand your beekeeping knowledge, the features you have come to appreciate are still present and expanded.

The Handbook does not tell you what to do. It provides options/alternatives on the basics of keeping bee colonies along with some of the not so common managements. It lists advantages and the disadvantages to help you make informed bee care decisions. It includes more than one means of accomplishing beekeeping tasks. Bulleted points help make the options clear. Step-by-step techniques make managements easier to follow. You probably carried the previous edition to the apiary/storage area and now it is sticky with honey and showing signs of wear. The newest edition would be an ideal candidate to replace that older copy of the Handbook.

New for the 5th edition are updates of bee pests and the techniques we might employ to help our bees fight varroa and viruses. Chapter 13 on Disease (renamed from Pathogens and Parasites) is expanded by 2 pages and Chapter 14 on Pests by 13 pages. The table comparing characteristics of diseases and pests is



now on opposing pages (240-241) rather than backed up. The listing of pesticide families is much clearer and informative. The section on IPM has been expanded with a new IPM triangle visual that you will find useful.

The appendix section on references has been updated and expanded. The glossary listing has been expanded with additional relevant beekeeping terms. For ease in locating related relevant information there is more cross-referencing within the text. As per usual, the line drawing visuals are clear and focused. Subheadings help you easily find the information you want to consult at a glance. As in previous editions the Handbook excels in content and for ease in following management suggestions.

This is one bee book you will return to time and again. It should be kept handy for frequent consulting. It is one book you will want to check out to up your beekeeping management. *Dewey Caron*

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BEE VET

Diagnosis Is A Tricky Thing

Dr. Tracy **Farone**

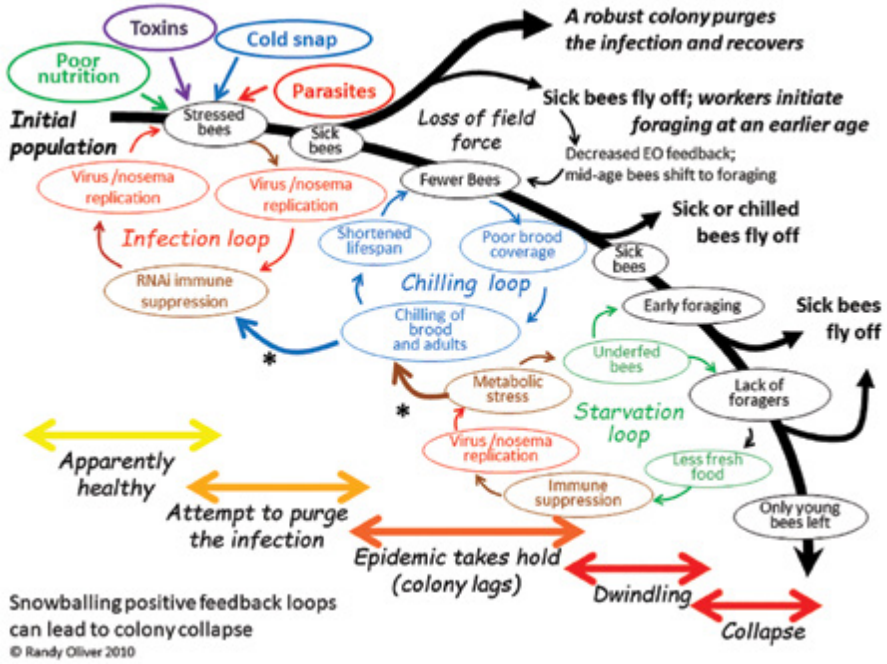
During my early years in clinical practice, I managed a case of a dog, "Red", with recurrent vomiting. Red was a fiery brown, mixed breed pup owned by a happy young couple. The dog seemed otherwise healthy, but he would come into the hospital for vomiting, we would treat him with the typical meds, he would improve, but ultimately, he would be back in a few days. X-rays and bloodwork did not show anything particularly abnormal. But one evening, Red came in very sick, and I decided it was time to open him up. X-rays were now consistent with an obstruction of the stomach. Interestingly, in surgery, I found a wine cork in Red's stomach at the pylorus, blocking the outflow to his duodenum (small intestine). I was able to easily "pop" the cork from the stomach, much to my nurse's amusement. After removing the cork from the stomach, I continued to "run the gut" . . . by slowly palpating the entire small intestine . . . duodenum, jejunum, ileum, down through the colon, feeling for any other foreign object, lump, or bump. My nurse asked me why I was doing this since I clearly already found the "problem". My answer was because I was trained to always look for more than one (condition).

Diagnosis is a tricky thing. Becoming a good diagnostician requires years of training and experience, knowledge, the curious inquiry of detective work, and the ability to see the big picture. Coming up with the "correct" diagnosis is a challenge to all doctors, including veterinarians. With colony loss being such a vexing issue in the beekeeping industry, beekeepers certainly share correct diagnostic challenges to identify and understand what happened to lost hives.

Medical conditions and diseases are diagnosed by meeting certain set criteria for diagnosis. For most conditions or diseases, this includes finding **clinical signs consistent with the disease or condition *and* a positive diagnostic test.** We rarely diagnose disease in asymptomatic patients, as it is hard to find something that does not present itself.

In beekeeping, we often use state and national beekeeping surveys to study reasons for colony loss. I would encourage beekeepers to take the time to fill out surveys like The Bee Informed Partnership's (BIP) annual survey as accurately as possible. Better data in equals better data out, which will benefit all beekeepers.

However, all scientific surveys, while helpful, have innate limitations. With beekeeping surveys, returns are often 10% or less of all beekeepers, and reasons for losses are often educated guesses from a variety of types and levels of beekeepers. Diagnostic testing may or may not be employed to confirm disease diagnosis. Sometimes survey questions can be hard to answer because they do not apply to your situation. I recently filled out a survey that did not give an option for no loss over Winter. I was forced to give a reason for loss even with none. Reasons beekeepers select for colony loss may be somewhat ambiguous with options like starvation, Winter, Summer, queen issues, weather, and various environmental hazards (chemicals, pesticides), other, and I do not know. For "starvation", ok but why really? Were they weak in the Fall, full of unchecked mites, did you leave them 40-80lbs of honey? For "winter", ok, but if all bees died because of Winter, we would have zero bees in one year – so what is the real reason/s? Look for more than one.



Randy Oliver developed a nice loop diagram showing how different underlying causes of colony loss can intermingle and have compounding effects. ***http://scientificbeekeeping.com/sick-bees-part-2-a-model-of-colony-collapse/***

Is this dysentery? Nope, just a long February without a colon cleanse!

Sometimes even "diagnostic" words do not help much. In medicine, we have a sophisticated sounding term for "I don't know", *idiopathic*, literally meaning the disease makes an idiot of us. In beekeeping, it is used to describe idiopathic brood disease. We still have much to learn.

Last Summer I lost a hive. It was a split that I made from a very robust hive at Spring extraction. The hive made a new queen, she made it back from mating and was starting to lay, when the Summer dearth and the worst drought in decades hit. I tried to feed in-hive sugar water to all hives, reduce entrances, but to no avail. The stronger hives took out this new queen and her colony by relentless robbing. So, what killed this hive? Robbing? The dearth? The drought? A beekeeper who gambled with a weaker split in a stronger yard and lost? Many would say "robbing". But what caused the robbing? All these things coming together contributed.

The problem with diagnosis is it is usually **not just one underlying cause**. In most cases, it is multiple things that bring down a hive or any animal. Co-morbidities. We all now know this word "co-morbidities" due to COVID-19 but how underlying conditions weakens any animal or human to disease or death has been well understood for a long time. Every stressor can contribute to colony loss. One stressor may not take out a healthy hive but persistent, multiple stressors over time certainly will.

So how can we, as beekeepers, intervene? Maintain healthy colonies by understanding their biology, providing good nutrition, biosecurity, and routine parasite control (*Varroa*), and adequate shelter (ex. dry, well-ventilated hives). These basic principles apply to maintain the good health of all animals and humans. Strive to develop a keen diagnostic eye so you will know when to just monitor and when to "go in after the cork".

...When I returned the wine cork (still showing identifiable markings on the cork) to Red's pet parents, they were amazed because they had not drunk any wine for over a month. But this little fact further explained the case history, corresponding to the start of Red's stomach issues. Post-operatively, Red recovered nicely since we had discovered the ultimate root of the problem. BC

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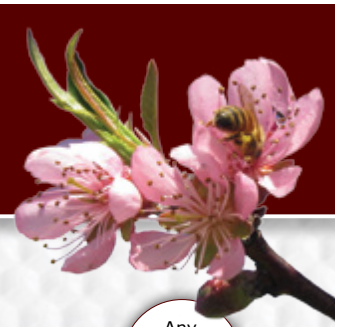

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FOUND IN TRANSLATION

Resilience

Jay **Evans**, USDA Beltsville Bee Lab

I have been wearing the same underwear for 25 years. And the only thing weird about that is how well they have held up. In the late 1990s, my dear sister sewed each of her brothers a pair of blue polypropylene long underwear as gifts. These were much appreciated and much worn. To my amazement, after thousands of uses (and yes, quite a few washes), my pair persists and is still in the winter rotation, alongside more recent commercial versions. Why?? They seem to be made of the same stuff and my sister, while talented in other ways, is not known as a world-class seamstress. I chalk it up to resilience in fabric and (more likely) dense stitching. Some honey bees and their colonies share this resilience and a lot of effort and money is directed at finding out why.

Honey bee colonies are fundamentally resilient compared to other insects in several ways. First, colonies can withstand losses of thousands of worker bees and still recover. As one extreme, they routinely cut themselves in half and both halves survive. Additionally, they can reconstitute their most vital reproductive organ, the queen, from a single egg she has left behind. Colonies also survive a wide range of temperatures and humidities, in part because they regulate both of these in their living quarters. Arguably, they tolerate a greater range of climate and temperature zones (from Maine to Miami and beyond) than all animals besides humans. Honey bee colonies also seem to make things work whether they are in a continual brood cycle, as are many commercially managed bees, or subject to short active seasons and long winters, as found toward the poles. While there is evidence for genetic bee lineages that do best in particular climates, the fact is that most honey bees will survive at any place in their worldwide range.

Still, if honey bees are so resilient why is so much effort needed to keep them alive? And why do they fail us so often? Bees and beekeepers regularly face three major challenges: a wide range of biological threats (parasites and pathogens, mainly, with cameos from bears and badgers), a food landscape that lets them down, and exposure to damaging chemicals. Professor Tjeerd Blacquière, from Wageningen University in the Netherlands, a leading agricultural university, has spent decades trying to understand honey bee resilience and working with beekeepers to improve the genetic traits that lead to resilience. The data from this research, and the improvements seen, show how sustained scientific effort leads to practical improvements for beekeepers. Blacquière and Delphine Panziera have summarized their thinking in an openly available article from *Bee World*, "A Plea for Use of Honey Bees' Natural Resilience in Beekeeping" (2018, volume 95:2, 34-38, **DOI: 10.1080/0005772X.2018.1430999**). They highlight several factors in the search for resilience, including both management and breeding ideals. The authors favor longterm 'survival' or 'black box' selection, whereby colonies are subjected to known stresses and then culled by the forces of selection, over the 'trait-based' selection found to be successful in many breeding programs. In trait-based selection, a key indicator of fitness is used to push populations; things like mite levels, hygienic behavior, or genetic markers for desired traits. Black-box selection, on the other hand, finds and exploits numerous genetic variants found in any population by subtly pushing the good combinations to higher frequency through stresses. The measures of success are as fundamental as colony survivorship, colony mass or reproduction by splitting. Both strategies *can* work and both have fan clubs. Perhaps the greatest challenge to natural selection approaches comes not in finding colonies or apiaries that do well, but in maintaining those traits for the long term, i.e., when selection is relaxed or the genetics of these colonies are diluted. Natural selection can favor expensive responses that serve a purpose for a certain time but are less useful later and hence are swiftly lost.

Trait-based selection suffers from the whack-a-mole liability. One can focus intensely on a single trait against a single threat and fail to protect against the next one and the next thereafter. Still, trait-based selection regimes used by breeders and scientists are often sophisticated and additive (e.g., bees that show hygienic behavior towards mites can be selected simultaneously for other behaviors such brood rearing patterns, or even non-behaviors such as individual immunity). As a geneticist, trait-based selection is more in my comfort zone, but it is fascinating to read the successes of Professor Blacquière and his 'black box selection' colleagues.

In some ways, the trait-selecters and the holistic crowd aren't far apart at all. As Panziera and Blacquière found, one of the predominant traits of resilient bees is *Varroa* sensitive hygiene (VSH), a trait high on the list of trait-selecters (Panziera, D., van Langevelde, F., & Blacquière, T. (2017) *Varroa* sensitive hygiene contributes

to naturally selected varroa resistance in honey bees. *Journal of Apicultural Research*, 56, 635–642, **https://doi.org/10.1080/00218839.2017.1351860**). Interestingly, though, a second resilient population from this same study showed VSH levels identical to controls, supporting their hypothesis that selection can run with multiple traits that are effective against strong threats. With Swiss colleagues and led by Arrigio Moro, Blacquière and Panziera recently scored multiple populations that had been under survival-based selection in the face of mite pressure. Again, VSH was important some of the time. Interestingly, the mites themselves also seem to have changed in the surviving stock. Clever cross-fostering experiments of mites from the two lineages suggest that mites in surviving populations become less impactful on their obligatory bee hosts after only a few years. (Moro, A.; Blacquière, T., Panziera, D., Dietemann, V., Neumann, P. Host-Parasite Co-Evolution in Real-Time: Changes in Honey Bee Resistance Mechanisms and Mite Reproductive Strategies. *Insects* 2021, 12, 120. **https:// doi.org/10.3390/insects12020120**).

So, this sounds interesting but what are the ground-rules for establishing more resilient populations. Blacquière and Panziera review several key points in establishing and propagating from resilient populations in their paper "Naturally selected *Varroa* resilient bees as re-wilding resource" (*Natural Bee Husbandry*, vol. 15, 28-31, **https://www.researchgate.net/publication/341494593**). First, start big, with 25-30 colonies or more. Keep this selected population away from other gene pools. Even more challenging, withhold all human controls for *Varroa* mites. Minimize other stresses such as food stress and, presumably, chemical stress. And don't expect results for four years or more. They also give guidelines for maintaining right-sized colonies and for housing and assisting swarms from successfully fit colonies. If you have the means, patience, and constitution to do this, report back in 25 years. I will be working on my second pair of underwear by then.

Finally, while we should all aim to use disease controls only when absolutely essential, please do not use this method if you cannot maintain distance from neighbors who are not on board. Your failing colonies will deliver mites to them, and their middling genes will hurt your chances of developing a special group of survivors. BC

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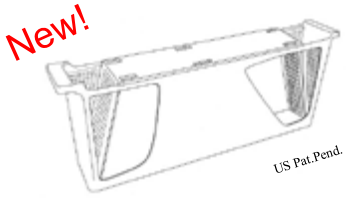

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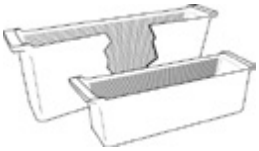

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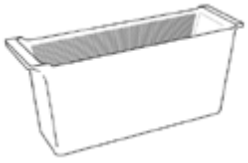

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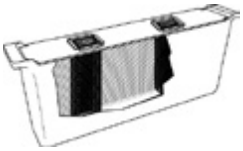

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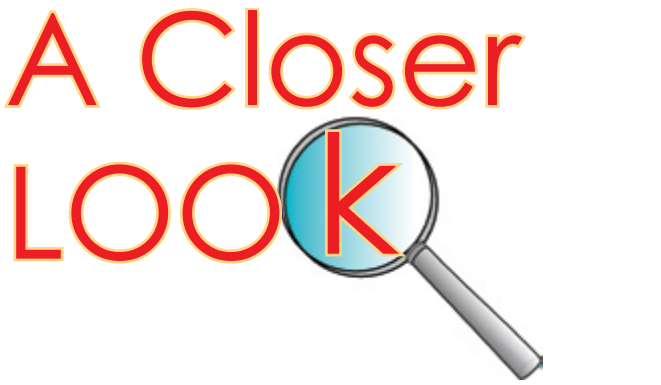
"The honey bee nest contains food stores in the form of honey and pollen, as well as the brood, the queen and the bees themselves. These resources have to be defended against a wide range of predators and parasites, a task that is performed by specialized workers, called guard bees. Guards tune their response to both the nature of the threat and the environmental conditions, in order to achieve an efficient trade-off between defense and loss of foraging workforce. By releasing alarm pheromones, they are able to recruit other bees to help them handle large predators. These chemicals trigger both rapid and longer-term changes in the behavior of nearby bees, thus priming them for defense (Nouvian et al. 2016)."

"Colony defense is divided into two distinct behaviors, guarding and stinging. A guard bee is a worker that patrols the entrance of the hive in search of bees, insects, animals or any other object that approaches the colony (Breed et al. 1990). Guards are very active and quickly approach and inspect bees that alight on the landing board before they are allowed to enter the hive. Inspection involves antennation of the newly arrived bee, which leads to the recognition of nest mates and the rejection of non-nest mates. Maschwitz (1964) reported that when bees standing at the entrance of the hive were disturbed, they released alarm pheromone to recruit other bees from the interior of the hive that were ready to sting. Breed et al. (1988) showed that guards are responsive to isopentyl acetate, the principal active compound found in the honey bee alarm pheromone. A significant correlation was found between the time that a bee guards and the number of bees in a colony that react to alarm pheromone. This correlation may establish a link between guards and responders via alarm pheromone recruitment (Maschwitz 1964; Moore et al. 1987), as reviewed by Arechavaleta-Velasco and Hunt 2003."

"Guarding is typically performed by bees during the transition period from inside duties to foraging. Guards can vary greatly in age but are usually two to three weeks old, and they consistently become foragers after or between guarding bouts. Guards are commonly seen sitting at the hive entrance in a characteristic stance, their forelegs off the ground and their antennae pointing forward, or, when very excited, with their mandibles open and their wings held away from their body, ready to fly towards any intruder (Breed and Rogers 1991; Butler and Free 1952; Free 1954; Moore et al. 1987; Paxton et al. 1994). The main roles of guards are to check whether incoming bees are their nestmates, and to alert the colony to the presence of a predator. The number of bees allocated to guarding is fairly small – only 10 to 15% of workers become guards (Moore et al. 1987) – and usually they guard for no more than a day. However, this number increases after a disturbance or when more intruders are trying to enter the hive (Breed et al. 1992; Butler and Free 1952). Colonies displaying a stronger overall defensive response tend to allocate more workers to guarding, and these guards remain active for a longer period (Arechavaleta-Velasco and Hunt 2003; Breed et al. 1988; Guzman-Novoa et al. 2004). The number of guards at the hive entrance correlates with the defensive response of a colony to a disturbance; however, only a small fraction of guards actually participates in the stinging response (Arechavaleta-Velasco and Hunt 2003). Thus, the main function of guards may be the detection



COLONY DEFENSE

Clarence **Collison**

Guarding and Stinging

and signaling of threats. There is some evidence that another population of bees- referred to as 'soldier bees'- is responsible for harassing any intruders, but this remains a subject of debate. The degree of wear of soldiers' wings is significantly lower than that of foragers of the same age, so it has been suggested that these bees spend more time inside the hive, where they can be quickly mobilized to the entrance (Breed et al. 1990, 1992). In addition, the propensity to sting is regulated by both genetic factors and age, with older bees being more likely to sting (Giray et al. 2000), as reviewed by (Nouvian et al. 2016)."

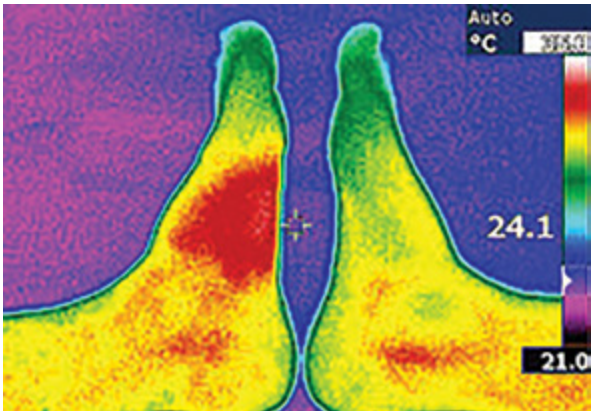
"Arechavaleta-Velasco and Hunt (2003) was able to identify genotypic variation in the expression of guarding behavior between defensive and gentle backcross colonies and to determine the role of guards in the defensive response of a colony. No differences were found between backcross types for the average time that a bee behaves as a guard. Differences were found between backcross types and between colonies for the number of bees that guard for at least one day and for at least two days. Variation between colonies for these two variables was

partially genetic in origin. A small proportion of the bees that stung during stinging assays were guards, and only a small proportion of the guards stung. Positive correlations were found between the number of stings and both the number of guards in the colony and the proportion of guards that stung in relation to the total number of guards in the colony. Colonies responded with fewer stings when guards were removed in comparison to when guards were present in the colonies."

"Two lines of evidence support the argument that colony defenders (stingers) are a behaviorally distinct group of bees. Some worker honey bees respond to major disturbances of the colony by flying around the assailant and possibly stinging; they are a subset of the bees involved in colony defense. These defenders have an open-ended age distribution similar to that of foragers, but defensive behavior is initiated at a younger age than foraging is. Behavioral and genetic evidence shows that defenders and foragers are distinct groups of older workers. Behaviorally, defenders have less worn wings than foragers, suggesting less flight activity. Genetically, defenders differ in allozyme frequencies, demonstrating different subfamily composition from foragers in the same colony. They also differ in allozyme frequencies from guards in the same colony, providing further evidence for division of labor associated with colony defense. Defenders and guards do not appear to be drawn from the same population within a colony and they are not a random sample of foragers. Because of their important role in colony defense, Breed et al. 1990, proposed that this newly characterized group of defender bees be called soldiers."

"Nestmate recognition by guards at the hive entrance is based on the perception of chemical cues carried by the arriving bee (cuticular hydrocarbons, especially alkenes) (Dani et al. 2005; Pradella et al. 2015). These cuticular cues have both a genetic component (Breed 1983; Getz and Smith 1983; Page et al. 1991) and an environmental component acquired inside the hive by contact with the comb wax (Breed et al. 1995,1998; d'Ettorre et al. 2006; Downs and Ratnieks 1999). The task of guards is thus to compare the chemical profile of incoming bees with that of their own colony (Nouvian et al. 2016)."

"Stinging by the honey bee is only one of many defensive behaviors. Collins et al. (1980) proposed a four step model for honey bee defensive behavior: alerting, activating, attracting and culminating. A worker bee initially becomes alerted to a disturbance and may 1) release alarm pheromones which alert other bees 2) move away from the area of disturbance or 3) proceed to the next step of the sequence. During the second step, activating, the bee makes random movements that may bring her into contact with the source of the disturbance. If the bee perceives stimuli to which she can orient (step three), she can proceed to express any one or more of the culminating actions of defensive behavior. These include such threat displays as flying at the intruder, loud buzzing, and burrowing into clothes, hair, or fur; actual physical contact through stinging, biting or hair-pulling: or leave the area of disturbance."



Bee sting on left.

"The defensive behavior of honey bee colonies was quantitated in the field throughout a three month season by the use of a standardized test in which numbers of stings in a leather target were counted after single colonies were opened and exposed to alarm pheromone. The main results show how the defensive behavior of honey bees is highly dependent on weather factors. Eliminating genetic variance, the following meteorological variables account for 92.4% of the variation in defensive behavior: air temperature, solar radiation intensity, wind velocity, relative humidity and barometric pressure (Southwick and Moritz 1987)."

"Pairs of colonies of differently colored bees were placed with their entrances only two inches apart, and many bees tried to enter the wrong colony, as if it were their own. Strangers were recognized by their different scent, and their reception depended upon foraging conditions. In nectar flows there was no hostility and the bees of both colonies mingled indiscriminately. In fairly good conditions there was no hostility, but partial separation was maintained through the discrimination shown by incoming foragers. In dearth conditions, when bees try to rob other colonies, all strangers were received with hostility; most were thrown out and many were killed. In dearth conditions marked foragers from one of the two colonies were fed with sugar syrup, but they were nevertheless repelled when they tried to enter the unfed colony; on the other hand, unfed strangers were more readily admitted into the fed colony. Thus hostility to strangers was inversely proportional to the availability of forage; the condition of the community which was to be entered was important, but the behavior of the intruder was not (Ribbands 1954)."

"Wager and Breed (2000) tested compounds found in honey bee sting alarm pheromone for their roles in releasing behavioral responses, with a focus on the relative importance of chemotaxis and motion of the target in the localization response. Some compounds in the blend have specialized functions. Benzyl acetate released only flight behavior, whereas three compounds (1- butanol, 1- octanol, and hexyl acetate) caused only the recruitment response. Other compounds (1-hexanol, butyl acetate, iso-pentyl acetate, and 2-nonanol) acted in more than one behavioral context. Octyl acetate was the most effective compound in allowing bees to locate targets, but did not

recruit or release flight behavior. Stationary octyl acetate sources were located by flying bees, indicating that this pheromone component elicits a chemotactic response. However, localization of a target is due primarily to the motion of the target; the alarm pheromone components release searching behavior for a moving object and are relatively unimportant in target localization."

"Alaux and Robinson (2007) showed that isopentyl acetate (IPA), a releaser pheromone that communicates alarm in honey bees, not only provokes a quick defensive response but also influences behavior for a longer period of time and affects brain gene expression. Exposure to IPA affected behavioral responsiveness to subsequent exposures to IPA and induced the expression of the immediate early gene and transcription factor c-Jun in the antennal lobes. Their findings blur the long-standing distinction between primer and releaser pheromone and highlight the pervasiveness of environmental regulation of brain gene expression."

"Worker bees of an "aggressive" line (Brown) were more easily alerted to disturbance, and much more responsive to alarm substance, than those of a "gentle" line (Van Scoy). The sting apparatus of Brown workers contained about one-third more isopentyl acetate (IPA) than that of Van Scoy workers. Brown x Van Scoy hybrids responded to human breath and to measured amounts of IPA to the same extent as Van Scoy, leading to the conclusion that the gentle Van Scoy response is due to dominant heredity. Response of the hybrids to disturbance (removing the hive cover) was intermediate, indicating lack of dominance. Production of IPA in the hybrids was very variable, but on the average it resembled that in the Brown, and gave an indication of heterosis (Boch and Rothenbuhler 1974)."

"Guzmán-Novoa et al. (2004) analyzed the relationships of the guarding, stinging, pursuing and alarm pheromone responses of two types of bees; European (EHB) and Africanized honey bees (AHB). Single type (source colonies) and two-type (EHB and AHB co-fostered) colonies were used. Of co-fostered bees, AHB comprised 81% of those that stung during the first 10 seconds. But from 10 to 30 seconds, AHB and EHB were equally likely to sting. However, when tested in their own colonies, two of the three EHB types did not sting and did not pursue in any of the eight trials conducted, whereas all three AHB types did in all trials. Moreover, AHB represented 90% of bees that stung observers during an 18-day observation period (25% of which were recently seen guarding). There was a relationship between pursuing and stinging of the six source colonies and the guarding behavior of co-fostered individuals from those sources. Results suggest that the more defensive bee types guard longer and may affect the thresholds of response of less defensive bees, recruiting them to sting. Results also suggest that the individual performance of different defensive tasks cause interactions that result in increased colony response." BC

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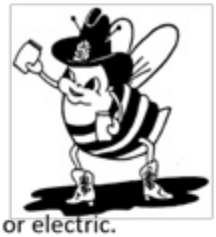

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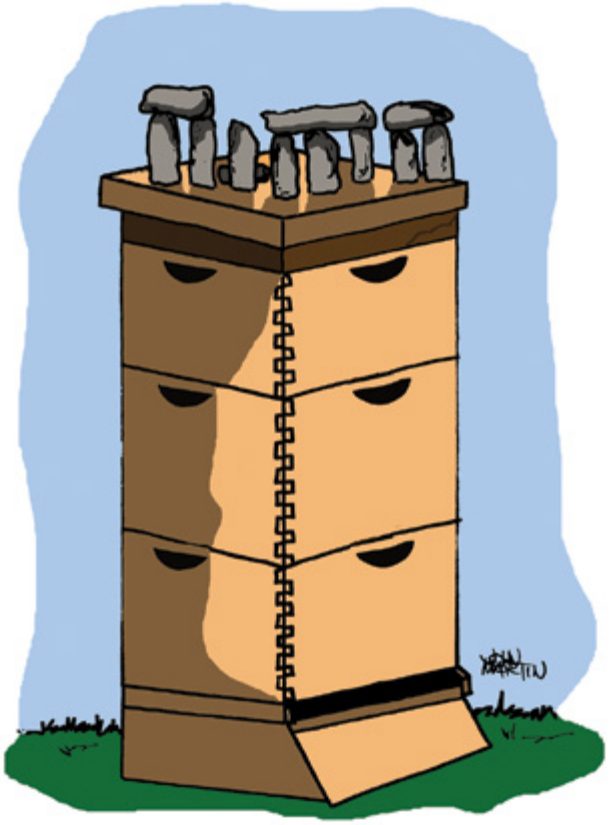
An Absent-Minded Beekeeper Strikes (A Match) Again

Stephen **Bishop**

I felt sorry for a beekeeper once and offered to help him work his hives. Boy, I'll never do that again. He actually accepted my help, which shows you how desperate he was. The beekeeper had the annoying habit of always describing the personality of each hive before we pried open the top. Having named his hives, he'd say stuff like, "Gertrude here is as gentle as can be. Don't even have to smoke ole Gertrude." Thereafter, the bees would boil out of Gertrude and nearly carry off the pickup truck before we could dive back in. The beekeeper would then apologize for mixing up Gertrude with Ernestine, who can "get a little feisty." It just goes to show you if you can't identify your hives, you'd best use name tags.

Some beekeepers use apps to remember the specifics of their hives. These apps are likely good, but I don't recommend them for beekeepers like me who spend half their time looking for their hive tool. Add a cell phone to keep tabs of while inspecting, and we might as well set up a grid pattern and call in search and rescue.

Michael Palmer has made famous the duct tape method for hive records. Basically, he puts strips of duct tape on his hive tops and scribbles shorthand on the duct tape. This method is pretty easy if you can remember the meaning of your shorthand, which is easier said than done: Does QL mean queenless or queen laying or queen lazy? Because I can't remember, I'm always curious and have to open the hive to find out, which defeats the whole point. Personally, I found it easier to use little hieroglyphics on the duct tape, like a bee with a crown on her head laying an egg to signify laying queen and a bee with a dunce hat laying an egg to signify drone layer. Since I have no artistic ability, it looks like I have comic strips drawn by a cave man on my hives.



Perhaps the simplest method for record keeping is rocks on hive tops. Rock formations are a great way to remember the goings-on in each hive. The problem with rocks is they tend to drift down the row. No one knows exactly how this happens. Some believe there's a purely scientific explanation, specifically a beekeeper removes a rock to inspect a hive and in so doing sits the rock on the hive next to it. The beekeeper repeats this over and over again, unwittingly, until all the rocks have collected on the last hive, creating a Stonehenge-type formation. This theory is unproven, however, and some believe that the bees have extraterrestrial help to create such formations. Others believe Bigfoot is to blame.

My wife bought me one of those little yellow beekeeping notebooks, in which you can record the vital signs for your hives and refer back to them before later hive inspections to increase efficiency. She always tells me to write stuff down so I don't forget, but then disapproves when I jot stuff down, merely on account that the little scraps of paper I use for jotting litter the kitchen counters and end tables and nightstands and various other surfaces throughout our domicile. Thus, she bought me the notebook in hopes that I would consolidate my jotting to a bound edition. It worked for a few weeks until I forgot to bring smoker fuel to the beeyard. It was a humid day after a rain and no dry vegetation could be found, so I had to strike a match and sacrifice my notebook for smoker fuel.

BC

Stephen Bishop is an absent-minded beekeeper in Shelby, NC. You can follow him on Twitter @ ***themisfitfarmer*** *or see more of his absent-minded musings at* ***misfitfarmer.com.***

Make Your Own Honey Powder

Charlotte **Anderson**

Make Your Own Honey Powder

Call it what you will: dehydrated honey, honey powder, or honey crystals-it is just another way to enjoy a remarkable substance made by bees. A favorite among the condiments, honey has many uses in the kitchen and beyond.

Perhaps you are already a fan of this sweet treat drizzled on ice cream, stirred into your morning coffee or added to those favorite baked cookies. Consider trying something new and learn how to dehydrate honey at home.

Can Honey Really be Dried?

Yes, it can be dried by removing most of the moisture content. The bees have already started the job by reducing the water in plant nectar. You can take things to the next step and remove even more of the water content.

The powdered form is nothing more than honey that has been dehydrated and ground into small crystals or powder.

How fine you grind the end product is a manner of personal preference. You may choose a very fine powder or even a slightly larger crystal resembling raw sugar.

Of course, you can buy honey powder ready to use. However, be sure to read the labels. It may contain other ingredients to ensure good pouring.

That is perfectly okay, just be sure you know what you are paying for. When you dehydrate your own honey at home, you control any additives.

Benefits of Dehydrated Honey

Already one of the most shelf stable foods, honey lasts virtually forever. When stored properly honey does not go bad. Yes, it may crystallize to a solid consistency.

But that is a natural state that most pure honey eventually becomes. Don't throw it out! You can decrystallize honey very easily.

Since this food made by bees is already so wonderful, why bother with dehydration?

Well, sometimes we want to use it in another form. The flavor of honey powder sprinkled on food offers a different texture than the liquid version.

Dehydrated honey is easier to store because it takes up less room. And, it dissolves faster in beverages – especially cold drinks.

Also, it is much easier to use in baking because you don't have to adjust the liquid level in the recipes. In this form you can use it just like sugar. However, since it is sweeter than sugar maybe you can use less.

Choosing the Best Honey

There are many varieties of honey to consider for your dehydration project. The color of honey and flavor is determined to a large degree by the plant nectar source used by the bees.

When it is made from many different nectar sources, it is often called "Wildflower Honey." If only one nectar source was used primarily you get varieties such as Sourwood Honey, Clover Honey or even Orange Blossom.

When you are planning to dry it, any variety will work. However, the product straight from the beekeeper often yields the best results. This should be no surprise as a small-scale producer has the opportunity to carefully tend to each jar.

For commercial purposes, large food packers sometimes filter their product to keep the jar looking nice for a long time. This packaging process may remove some of the good benefits of this raw food.

However, if you cannot locate any directly from a beekeeper. Try to find the best raw product at the grocery. Thick honey will work better than that which is runny with a higher water content.

Process of Honey Dehydration

Materials Needed:
Silicone/Teflon sheets or suitable paper
Honey
Food Grade Desiccant
Dehydrator with trays/inserts
Food processor or blender-bullet
Spoon or spatula

1. Prepare Silicone Sheets or Paper

You can use special silicone sheets that fit your dehydrator trays or parchment paper or freezer paper to hold your honey in place.

If using paper, cut the sheets to fit your trays and place them in. Make sure your dehydrator is sitting on a level surface. Otherwise, your honey many flow and pool over the tray.

2. Pour Honey on Sheets

Work with one tray at a time. Pour honey onto the sheet. You can pour it in the middle and spread outward or drizzle a pattern across the sheet.

Start small, you can add a bit easier than you can get it off. If you want to add any flavors such as cinnamon or ginger -now is the time.

3. Spread Evenly to a Thin Coat

Use a spatula or large spoon to spread the honey across the sheet. It

must not be thicker than 1/8" and it is best if it is spread uniformly. The best results are achieved when the honey is spread very thinly.

Warming the honey a bit may help in spreading it across the sheet or paper. I hold one side down with a finger and use the spatula to spread the honey moving away from the held down side.

4. Set Dehydrator to 120°F

Set the dehydrator to 120°F /40°C. Now for the part that requires a lot of patience. Run the dehydrator until the honey is hard and crisp.

How long it takes depends on your dehydrator, the humidity in the room, and the water content of your honey: 24-48 (or more!) hours is common.

Check it every six to eight hours to make sure it is not becoming burnt. It is finished when it is set and no longer sticky.

5. Remove Dried Honey Pieces

Once the product is ready, it will easily break into pieces and not be sticky to the touch.

You want to have everything ready to crush and store as soon as the honey cools a bit. Do not leave it sitting around it will absorb moisture.

If you are using teflon dehydrator sheets, the dehydrated honey will pop right off. Otherwise use a spatula to remove the chips of honey from the paper.

6. Grind to Desired Consistency

Grind using a food processor, (mortar and pestle) or I used my Magic Bullet to the desired consistency.

7. Storing Dehydrated Honey

Immediately, place in a tight sealing jar and toss in a food grade desiccant package. This helps prevent clumping - but clumping will occur. This is raw honey. Honey powder that you buy already made has other ingredients to help it flow.

How to Dehydrate Honey without a Dehydrator

If you want to create some dried honey crystals but lack a dehydrator, there is another option. Though the heat may destroy some of the nutritional aspects of this raw food.

Use a pot on the stove to heat your honey. Allow room for expansion as the it will bubble up. Use a candy thermometer to achieve a temperature of 300°F /148°C. This is the hard crack candy stage. Do not over heat or it will burn and be careful to avoid burning yourself.

Remove from stove and quickly pour hot honey on your silicone sheets (or parchment paper) lined flat pans. Leave to cool in a dry – low humidity environment. Then crush or grind to the desired consistency.

*I have not used this method to make honey powder because I strive to keep my raw honey..raw.

Notes and Tips:

Though I have read that it will work, the round dehydrators with heat at the bottom did not work for me. After spreading the honey in a very thin layer, I ran the small machine for 4 days in a room with a dehumidifier going.

It did not work. When I used my square Excaliber Dehydrator with heat at the back, my honey was dried in two days.

I did not use the screens under my teflon sheets - that was a mistake. It allowed the honey to pool in spots. This made even drying a tricky problem

Honey absorbs moisture from the air and will do so within a few minutes. This causes stickiness which we really do not want. Run an air conditioner or dehumidifier in the room during the drying and grinding process if the humidity is high.

Dehydrating honey is not the best way to store honey as it takes a while to dry. However, there are some applications where having a powdered honey is a plus.

Ways to Use Dehydrated Honey Powder

Once you have a store of dried honey packaged away for easy keeping, you will find a multitude of ways to put it to good use. These are just a few ideas to get you started:

- Use as a sweetener in coffee or tea
- Dissolves nicely in cold drinks too
- Sprinkle on ice cream
- Dust fruits with powder when drying them in dehydrator
- Use instead of brown sugar in backed goods
- Easy to take with you on camping trips or hiking

A Final Word on Dehydrating Honey

Honey is a perfect food for bees because it stores for a long time without spoiling. In this way it provides the colony with food to eat during the long cold Winter months. It will do the same for us. Whether you enjoy it in its regular form, creamed honey or even eating honey in the comb, it is a welcome addition to the menu. BC

Master Beekeeper, Charlotte Anderson shares her love of all things honeybee. She helps others become better beekeepers and teaches new beekeepers how to get started. Her mission is spreading awareness of the importance of honey bees. She is a former Beekeeper of the Year in South Carolina. ***https://carolinahoneybees.com***

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Minding Your Bees And Cues

Do You Really Need To Spray That?

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

On a recent trip to an apiary, we encountered a neighboring homeowner outfitted in a backpack sprayer, carefully spraying dandelions towards the ever elusive goal of a flawless emerald-colored lawn. Nothing against emeralds, but this deeply ingrained lawn aesthetic poses a few problems for bees. Flowerlessness means foodlessness for pollinators, but more dangerous still is the battle between man and dandelion, often fought with pesticides.

And dandelions will assert their will to power.

Back to our friendly homeowner who was working hard against his golden foes. When we inquired about what he was spraying, explaining that we kept honey bees nearby, he was immediately concerned. In fact, he had a large prairie planted in one section of his yard that supported the local wingeds. He asked us about bee-safe alternatives for maintaining his turf.

While at first this might read as a weird contradiction, it's actually pretty common. There are lots of reasons to want to maintain a lawn beyond aesthetics, including picnics, kids, ball games, a dislike of ticks and chiggers, golf, city ordinances, etc. And it's human nature to both try (the prairie) and fail (spraying dandelions) all in one day. Just today, one of us filled her reusable shopping bag (great job!) with avocados flown in from the other side of the world (sorry).

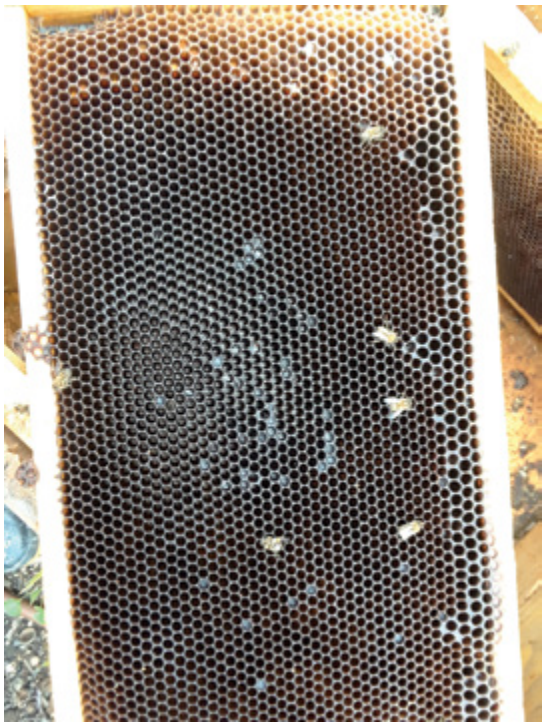
The word *pesticide* is often misused interchangeably with the word *insecticide*. The simple definition of *pesticide* is a chemical used to kill a pest. Insecticides, fungicides, herbicides (our homeowner's weapon against dandelions) and miticides are all considered pesticides. How people use pesticides impacts our bees, but at the same time, as beekeepers we are acutely aware of the difficulty of managing tenacious pests. Many of us use pesticides in our colonies to fight varroa mites, so we can easily sympathize with the difficulty of pest control (pest, from the Latin *pestis,* "...a deadly disease, a curse or bane.")

Some people make good cases for the use of pesticides, like farmers who use them to keep their crops from being absolutely destroyed. Do we hope the world moves away from agrochemicals? Absolutely. But it's a complicated conversation that needs to be had before it can be resolved completely in the bees' favor. Beekeepers should be talking to farmers, finding ways to connect, sharing resources about pollinator planting programs, and learning about farmers' concerns. You might be surprised at how much they are already doing to support bees (please read our article about our friend Farmer Keith). If your bees are close to farmland, you can also register their location at **https://beecheck.org/**, though this step isn't in lieu of real live farmer-beekeeper conversations.

Spraying dandelion blooms directly with herbicides can result in bees bringing these chemicals back to their hives. Photo by Bridget Mendel

Mosquito Control is another profession famous for their pesticide use, and honestly we're grateful to them. Even *controlled*, mosquitos can truly ruin a summer's evening, and we're personally glad that we get to worry more about wasps sampling our picnic fare than about West Nile virus and encephalitis putting a sad twist on our picnicking lifestyle. But mosquito control can absolutely negatively impact bee health depending on the type and location of the pesticide use. Reach out to your local mosquito control district for information about how they protect pollinators.

Back to our friendly lawn lover. He was technically applying the herbicide correctly; the label does not direct the user to avoid spraying the flowers. We did share that bees visiting the treated flowers would bring the herbicide back to their home. But our very best suggestion was to give up entirely on the idea of the monoculture lawn and embrace the possibility of a "bee lawn" (**https://www.beelab.umn.edu/learn-more/beelawn**). Our colleagues at the Bee Lab thought long and hard about the whys and wherefores of lawns, in order to create an easy-to-maintain and bee-friendly alternative that still gave you that crisp, buzz cut look. When approaching neighbors, be generous with information about better, bee friendly turf (Bee Lawns).



The dark cells in the brood nest area of this frame are filled with pollen that was entombed in propolis by the bees. It is an indication that the pollen is contaminated with a fungicide. Photo by Becky Masterman

Many simply haven't considered how their lawn care might be affecting pollinators, and will be happy to chat. For inspiration on cutting back on cosmetic pesticides, check out this link for information on Ontario's long-time lawn and garden pesticide regulations (**https://www.ontario.ca/page/pesticides-home-lawns-and-gardens**).

Our visit with the 'open to suggestions' homeowner made it clear that if we are going to point out bee unfriendly practices, we should have some bee friendly alternatives ready to share. Otherwise, we're just being judgmental. Like the researchers who developed the bee lawns, it's important to ask why people are using pesticides in the first place. It's unlikely to be an idle hobby, and while we personally go to weird lengths to help bees (one day we'll write about Becky's "bee bridge" project), we recognize that most people have human-centric priorities, and we totally respect that. Our goal is to help people find alternatives to pesticides whenever possible. The world can't be perfect, but it can be more-so.

Minding Your Bees and Beeswax

Beekeepers should know the signs of pesticides impacting their bees and the safety of their hive products. Here is an excellent article from Purdue Extension with this information: **https://extension.entm.purdue.edu/publications/E-53/E-53.html**

Pesticides in wax, pollen and nectar are ubiquitous and a potential danger to both developing and adult bees (Zioga et al. 2020, Wilmart et al. 2021). Except for entombed pollen (see photo) which is often a fungicide contaminated pollen that the bees entomb with propolis (vanEnglesdorp et al. 2009), it is difficult to determine what chemicals might be in your hive without expensive testing. Rotating out brood combs every three to five years is a management strategy that addresses wax contamination issues. BC

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Acknowledgement

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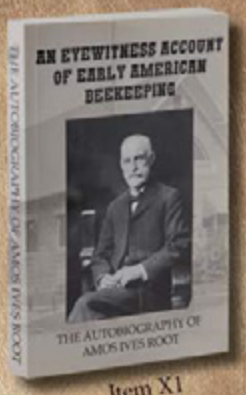
Authors

Becky Masterman led the UMN Bee Squad from 2013-2019 and currently alternates between acting as an advisor and worker bee for the program. Bridget Mendel joined the Bee Squad in 2013 and has led the program since 2020. Photos of Becky (left) and Bridget (right) looking for their lost hives.

TAKE A STEP BACK...



Item X1

One day in August 1865 a stray swarm of bees passing through the air attracted his attention. That evening, after hiving the swarm, other books and papers had to be laid aside in favor of anything pertaining to bees and bee culture. From that time on he was a student and breeder of the honey bee. It has been said that he did more than any other man in America to commercialize beekeeping. Take a step back in time and follow his journey and see how his quest for knowledge and profound religious conviction helped shape American beekeeping.

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Why Alberta beekeepers need foreign **AND local workers**

Kieran Brett, Alberta Beekeepers Commission

There's a lot of talk about reserving agricultural jobs for Canadians, rather than inviting foreign workers in. In this special report from Alberta Beekeepers Commission, we check in on two Alberta honey operations and their local and foreign staff, to learn why that's just not realistic.

When urban people think about Temporary Foreign Workers on Canadian farms, some are quick to make assumptions. Mike deJong has heard them all.

"There are some myths that have taken hold and we need to explain to people, that's not how it really is," says deJong, who owns Busy Bee Farm near Camrose, Alberta with his wife Jenny. "The two main myths are, people think our foreign workers are paid very little and live in poor accommodations."

In a year like 2021, some have said that keeping foreign workers out would boost employment opportunities for Canadians in the post-COVID recovery.

DeJong believes it's not that simple. He maintains that local workers can't replace the skill and experience of his team of up to 16 workers from Mexico and the Philippines.

"We've always relied on both foreign labour and Canadians from our local area," says deJong. "We will typically have 12 to 16 workers from overseas – and then seven to 10 Canadian youth who might be high school or university students." As deJong explains, before setting up Busy Bee Farm in 2008, he gained experience by working on other Alberta honey operations. Many Canadian workers are looking to do the same, rather than staying with the same employer longer term. Younger Canadians might work a few weeks here and there, then return to school or travel.

It's different when you're in it for life. "Beekeeping is a lifestyle and it doesn't suit everyone," says deJong. "We'll start at 8 am and we might work until 8 or 9 pm – then we get up the next day and do it again."

The deJongs have taken pride in building staff accommodations that allow each worker the space, quiet and privacy of having their own room. It's a long way from the mistaken public image of foreign worker housing.

"Several of the guys have been with us the past 10 years, and they've made a huge contribution to our farm," says deJong. "They are like family to us, and of course we want them to be comfortable."

In this kind of work, skill is vital and there's no substitute for experience. Someone who's new to beekeeping takes a long time to get efficient and self-directed at it. That's where deJong's long-standing Mexican and Filipino team members truly excel.

"We can have between 8,000 and 10,000 hives, spread out over many locations. I need to know that people know what they're doing when they open a hive," he says. "My 16 foreign guys are so experienced, it runs like clockwork. There is just no replacing them."

Local student says foreign workers' experience is key

For Adam Tomm, the Summer of 2020 was a learning experience he'll never forget. He worked at Mike deJong's bee operation in a variety of roles. At first, the learning curve was steep.

"The first day was a bit of a shock, because the work is very fast-paced," says Tomm, currently a second-year Mechanical Engineering student at the University of Alberta. "There is a lot of physical activity and I was not in shape for the first week or two." Local employees receive most of their instruction and supervision from deJong himself. The farm's seasoned crew of Mexican and Filipino workers also readily share their knowledge with the local people.

"If they saw me struggling with something, they'd come over and show me a better way to do it," Tomm says.

At Busy Bee Farm, 12-hour shifts are common in the Summer and crews work six days per week. On days when deJong's bees were pollinating canola seed fields in southern Alberta, the drive to the Brooks or Vauxhall area would start at 5 am and they'd return to the farm at 8 pm or 9 pm.

During the Summer's long work shifts, Tomm came to admire the work ethic, experience and beekeeping skill of the overseas crew.

"One thing was, we might have hundreds of beeyards to get to, and sometimes, even just finding them is a challenge," says Tomm. "They know every bee yard by its own name and know how to get there."

Tomm and the other local people worked hard, but he believes the foreign crew's long experience is a huge difference-maker for the farm business. If someone thinks to replace foreign beekeeping workers by hiring only locals, Tomm doubts that approach is feasible.

"They work hard, and they know what to do," he says. "They do the job like no one else could."

View from a veteran Mexican beekeeper

For Jesus Alonzo Tapia Soria, 2020 was the fifth year he's come to Canada to work seasonally for Mike deJong at Busy Bee Farms.

"We usually get here in mid-March, but because of the border being closed, we had to wait a month," says Soria, who previously worked 14 years for a farmer in Ontario.

As he describes his typical daily duties at Busy Bee Farm from Spring to Fall, it's clear this is high-skill, high-judgment work. It includes checking hives and queens, sorting frames and feeding bees. Because Soria and other crew members have worked together for years, their individual skills are augmented by carefully coordinated teamwork.

"It saves a lot of time because Mike doesn't have to explain what to do in a beeyard," he says. "The Mexican and Filipino guys have a lot of experience."

Soria notes that crew members appreciate the comfort and privacy available at Busy Bee Farm's staff accommodation. It's one more factor – along with a close-knit team and an attractive wage – that keeps him returning to Canada. In fact, 2021 will be his 20th year.

"I have come every year because it's good for me and my family," says Soria. "Everything that I have in Mexico is because I come to work in Canada."

All in the family

The term Temporary Foreign Worker doesn't come close to describing the tight-knit crew Reece Chandler has built at Scandia Honey over the past quarter-century.

As Canada's largest honey operation, with 15,000 hives, the business relies on its consistent, highly skilled, team-oriented staff.

"All my staff is longer term," says Chandler, who with wife Echo owns and operates this beekeeping operation located in Scandia, Alberta. "We have a lot of continuity with our crews from year to year. We bought the business

25 years ago, and one gentleman from Mexico has been with us for 24 of those years."

During the key Spring-to-Autumn period, the operation employs 10 local people and 15 staff from outside Canada: from Mexico, the Philippines, Thailand, South Africa and New Zealand.

When asked about the viability of just hiring 25 Canadians instead, Chandler shakes his head.

For one thing, the needs of the two groups are complementary. Scandia's foreign staff come to work for six to eight months. Many have farms back home and couldn't be away for longer than that.

Some of Scandia's local workforce are full-time and year-round. Others just work seasonally. A university student might want three or four months of work, less than what Scandia has available. Not only that, more than a few Canadians have been challenged by the work itself.

"This kind of work doesn't suit everyone," says Chandler. "It is hard, hot work, up to 40C in the summer sometimes, and of course, there are the bee stings. We've had people last a day. When we advertise locally, we sometimes get the same number of applicants as the jobs we're filling."

Chandler can sometimes be frustrated by people's assumptions about the Temporary Foreign Worker program, in terms of pay, health care and housing. Round-trip airfare to Canada is paid by the employer, pay rates are not below Canadian minimum wage and health insurance is paid privately by the employer. In short, the Canadian taxpayer is not paying for anything.

From his early years owning Scandia Honey, Chandler favored hiring family members of his foreign staff. A staff member, for example, might recommend a brother, uncle or cousin to work the following season. Over time, the family connections multiplied, resulting in great team chemistry. Similar family connections are there among local staff too.

"When you have a family member join your team, you want that new person to succeed," Chandler says. "They train each other really well, and of course for the people from outside Canada, having family around makes your off-hours more comfortable. We have great staff housing that is inspected once a year by the local health authority. We try to make it comfortable, so there's a gym room and a movie room. When you're also among family, well, people tell us that's everything they need."

Work in Canada means opportunity

Reece Chandler couldn't run his business without the skill, experience and hard work of his foreign staff.

As long-time staff member German Vega Morales explains, people from Mexico appreciate the opportunity to work in Canada.

In 2020, COVID delayed his arrival in Canada to work at Scandia Honey. In 2021, he quarantined for two weeks after his arrival in Canada, with frequent COVID testing to minimize risk. Still, he believes it's well worth it.

"In Mexico, we don't have enough jobs," Morales says. "This program helps people in Mexico who want to come for 6 or 7 months. We work to support our families, so this is a good opportunity for my family. Violence has been a big problem in Mexico for the past 40 years, and Canada is very safe."

Meet beekeeping's next generation

Family connections are important among Scandia Honey's Canadian staff as well. Abe Neufeld got to know the operation as a child. His father Isaac is now in his 18th year with the Chandlers.

Neufeld (the younger) started working at Scandia during the summer season at age 14. He's now been full-time for four years and is delighted with his career choice. He enjoys the teamwork and camaraderie of both the Canadian and foreign team members. Neufeld has even picked up a little Spanish, a side benefit of working at Scandia.

"It took some time to get used to the heat and how hard you work, and for sure, all the bee stings," he says. "But I worked my way up. I did try some other jobs, but I prefer this because it feels like you're working with family and the work is always different."

Neufeld has observed that some Canadians don't take to the work as readily as he did. Tough physical labor under frequently hot conditions, along with the certainty of painful bee stings, makes it difficult to find and keep new Canadian crew members.

"It's not for everyone, but for some people, beekeeping just gets in your blood," says Neufeld. "Every day when I come in, I'm happy to be here. I can go to sleep at night with the thought that I have a good job. I like telling people I'm a beekeeper, and how much I love my job." BC

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Susan Cobey runs Honey Bee Insemination Service and holds a 50% appointment with WA State University. She founded the New World Carniolan Program, now in its 40th generation. Her focus is enhancement of honey bee stocks and improvement of colony health through selective breeding. To diversify the U.S. gene pool, this includes the collection and incorporation of honey bee germplasm from their native European range. She provides training, instructional material and information in presentations, publications for both scientific and public audiences, worldwide to promote honey bee stock improvement. Her experience includes management of Honey Bee Research Laboratories at the OH State University and the University of CA, Davis.

Geraldine Wright is the Hope Professor of Entomology in the Department of Zoology at the University of Oxford, UK. Her lab specializes in research on the physiology and behavior of bees. She has over 25 years of experience in insect nutrition and has worked with honeybees for the past 20 years. Her research program includes expertise in bee chemical senses (olfaction and gustation), the mechanisms of learning and memory, and bee nutrition. Her group has made major contributions to what is known about the honey bee and the bumblebee's sense of taste. One of her contributions in this field published in the journal, *Nature*, showed that bees had difficulty detecting neonicotinoid pesticides in nectar. Her lab discovered that bees have special gustatory mechanisms mediated by gap junctions for sugar detection reported in Current Biology. Her group was the first to show that non-nutrient compounds like caffeine found in nectar influence the behavior of bees. Her lab is currently investigating the basis for addictive behavior in bees.

Nina Bagley has been an urban beekeeper for 17 years. Nina worked with a master beekeeper for eight years raising queens. She has several apiaries in the City, and she raises her own Queens. Nina has completed Dr. Joe Latshaw's instrumental insemination class. She completed the Master Beekeeping classes taught by Dr. Jerry Bromenshenk's program through the University of Montana. She is an avid collector of early bee books and history. Nina has managed the Bee Pavilion at the Ohio State Fair for ten years sponsored by OSBA. She over sees the State House Bees. She also over sees the Frank Fetch Park. In 2010 it was the first pilot hive placed in a park in Downtown Columbus, OH. She is currently the Franklin County Bee Inspector for OH.

Tammy Horn Potter helped her grandfather with his beehives beginning in 1997. In 2006-2010, she worked winter seasons with Big Island Queens in Hawaii. In 2008, she started Coal Country Beeworks, working with surface mine companies to establish pollinator habitat and apiaries in Eastern KY. In 2014, she became the KY State Apiarist, helping create the KY Department of Agriculture Pollinator Protection Plan, the KY Certified Honey Producers program, and the KY Queen Bee Breeders Association. From 2015-2020, she has coordinated the USDA Honey Bee Health Survey in Kentucky. She also serves on the boards of Eastern Apicultural Society, Project Apis M, Honey Bee Health Coalition, and Green Forests Work. She is the author of the following books: *Bees in America: How the Honey Bee Shaped a Nation* (2005); *Beeconomy: What Women and Bees teach us about Local Trade and Global Markets* (2012); *Flower Power: Establishing Pollinator Habitat* (2019); and *Work I Knew I Must: Reminiscence of Forty-one Years of Factory Life* (Root, 2021).

Kim Skyrm is the current President of the Apiary Inspectors of America (AIA) and the Chief Apiary Inspector for the MA Department of Agricultural Resources (MDAR). Prior to these appointments, Dr. Skyrm received a Ph.D from OR State University focused on the environmental impacts affecting bumble bees native to the Willamette Valley of Western OR, was a Research and Development Scientist for Koppert Biological Systems, Inc. specializing in commercial bumble bee rearing and a Post-Doctoral Researcher at the University of MA-Amherst evaluating bumble bee colonies in the cranberry agroecosystem. Dr. Skyrm is an alumni of GA Southern University (Bachelors in Science, Biology) and the University of NE-Lincoln (Masters in Science, Entomology with Education minor). In addition to being a bombiculturist (i.e. bumble bee rearing), Kim is also a hobby honey beekeeper. Kim has always been driven by an intense love of bees to serve in supporting roles informed by the latest scientific research. This is evident since Kim has been working with native and managed bees, beekeepers, farmers, and pesticide applicators for the past 14 years through outreach education, research, and extension. Kim has a "bees-eye view" of the world and is truly passionate about continuing to do work that preserves the viability and sustainability of bee populations!

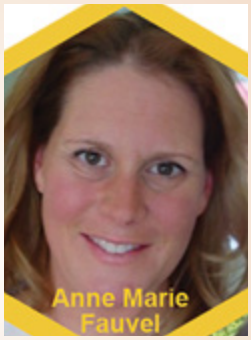
We hope to see you in October!

Be sure and visit www.BeeCulture.com

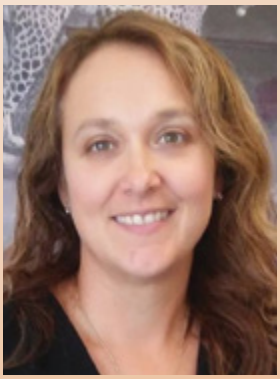
EST-1869 ROOT PUBLICATIONS

Barbara Bloetscher has been the State Entomologist/Apiarist at the Ohio Department of Agriculture since 2009, after 23 years at The Ohio State University Extension. As State Apiarist, she oversees the Apiary Program and identifies insects and other arthropods submitted from Ohio Nursery inspectors and businesses. Barb monitors the County Apiary Inspection Program and addresses honey bee issues in the state. Barb has kept her own colonies of honey bees for over 35 years and belongs to several beekeeping clubs as well as The Ohio Lepidopterists and other insect related organizations.

Joan Gunter was raised in rural ND on the family farm. She attended college and earned a degree in education and business. After graduating, she taught school on all levels for 10 years while raising two boys with her husband Dwight. Joan and Dwight of Towner, ND, have been commercial migratory beekeepers for over 30 years traveling to MS, TX and CA. The family-owned company is primarily engaged in honey production, queen rearing, pollination and the sale of bees. Joan currently serves as President of the American Beekeeping Federation (ABF) as well as Trustee for the Foundation for the Preservation of Honey Bees. She is also active with the National Honey Board, the Honey Bee Health Coalition and the state beekeeping organizations of ND, MS and TX.



The Bee Informed Partnership (BIP) is a small non-profit organization with a broad reach. Our mission is to improve honey bee colony health across the U.S. We do so by working closely with beekeepers, researchers and different sectors of the industry. We assess colony health and report back to beekeepers so they can make data-driven management decisions in real-time. Seven women support multiple BIP programs including the Annual National Colony Loss and Management Survey, the Sentinel Apiary Program for backyard beekeepers, the Tech Transfer Team program in five regions across the country working with commercial beekeepers and a variety of other projects ranging from IT products to specific product and/or management custom trials. Annette Meredith, PhD, BIP's executive director brings a much needed non-profit expertise. Nathalie Steinhauer, PhD is our Chief Science Coordinator and the brains behind BIP data. Jeri Parrent, PhD, our grants administrator keeps us funded and connected. Rachel Kuipers leads our Sentinel Apiary Program. Anne Marie Fauvel, the Tech Transfer Team Coordinator, facilitates field work and data collection. Our honey bee health database is designed, engineered and maintained by Mikayla Wilson, our IT and Database Engineer. Heather Eversole is the Univ of MD Bee Lab Manager who has been processing samples since the start of BIP. Learn more at **www.beeinformed.org.**



Tracy Farone is a Professor of Biology at Grove City College in PA. She has worked in various areas of private practice, academia, and research for over 21 years. Since 2016, Dr. Farone has been researching beekeeping and bee medicine. In 2018, she was granted a sabbatical to allow additional time to pursue apicultural studies and develop a teaching and research apiary at her college. In 2019, she worked in the field with dozens of backyard, sideline, and commercial beekeepers. She visited France, where she worked with multiple experts in bee medicine and research at ONIRIS College in Nantes and the OIE in Paris. Additionally, she visited The University of Edinburgh and the Roslin Institute in Scotland, meeting with additional bee experts. She traveled to Montana/Crow Reservation to work with 10K hive, migratory, commercial beekeeping operations. She has published several articles on bee medicine, including a monthly "Bee Vet" series for *Bee Culture*, written biosecurity industry guidelines for veterinarians entering beeyards, and developed an educational website, **https://www.gccbee-project.com/**. Dr. Farone's work has also been featured in the JAVMA. She is currently writing chapter on bee medicine for a veterinary textbook, consulting nationally and internationally (including Apimondia working groups) with industry stakeholders, and managing two beeyards with the help of her six research students.

Maggie Lamothe Boudreau is the sole owner of "Rayons de Miel" a 350 hive farm that produces 4000 queens/year. She recently enrolled for a Master's Degree in beekeeping at Laval University in order to keep improving her knowledge of beekeeping sciences with the goal of improving research throughout Canada and more particularly Quebec. All this for the purpose of helping the beekeeping industry in its quest for self-sufficiency in bees and especially in quality queens. Canadian commercial queen breeders are currently unable to supply queens before the beginning of June. Without access to queens early in the season, the opportunities for beekeepers to save their hives or create nucs very early in the season is greatly reduced, if not impossible. Her farm is directly contributing to her research project by producing queens during the previous Fall with the aim of inserting them in a "queenbank" until the following Spring so they can be used very early in the season. These queens would save a considerable amount of hives from which the queen died, or to produce nucs sufficiently early to contribute to the pollination effort of crops. She also has many volunteer involvements with official beekeeping organizations such as the Quebec Beekeepers Association AADQ, the Quebec and Eastern Quebec Beekeepers Committee and the national organization the Canadian Honey Council just to name a few.

Jackie Park-Burris was born into the Park beekeeping family of Northern CA. She managed the queen rearing portion of her parents' bee business and after the unexpected passing of her beloved father, she purchased the business from her Mother. In 1994 Jackie Park-Burris Queens, Inc. was started. She has concentrated on breeding a healthier, hygienic, honey producing queen, even incorporating genetics from Italy to improve the diversity of Jackie's line of popular Park Italian Queens. Jackie has also continued the family tradition of being active in the bee industry. She has served as President of the CA State Beekeepers Association, the first woman President of the CA Bee Breeders Association and the first woman Chairman of the CA State Apiary Board. She has served on the CA State Beekeepers Association's board of directors for over 25 years. She is currently serving as the Legislative Chairman and an Executive Director on the board. They have honored her with the Young Beekeeper of the year in 1997, Beekeeper of the year in 2009 and twice with the President's Award. Jackie is married to Jim Burris and is mom to Ryan (wife Kimberly) and Randal (wife Andrea) Burris. She is JJ to grandchildren Parker, Jack and Maverick Burris!

Julianne Grose is an Associate Professor in the Department of Microbiology and Molecular Biology at Brigham Young University. Her university position consists of 45% effort for teaching, 45% effort for mentoring/research and 10% effort for citizenship. She teaches approximately 12 credit hours of undergraduate courses per year (approximately six courses) and currently mentors three graduate students and 15 undergraduates in her research lab. Her teaching is dedicated to bringing novel research experiences into the classroom through an international program, Phage Hunters (HHMI SEA- PHAGES program). Research in her laboratory is dedicated to two main projects: 1) the study of metabolism and its relation to disease, and 2) the study of microbiomes and their contribution to the health of organisms, including bacteriophages that infect the Enterobacteriaceae family of bacteria. The latter is a continuation of the Phage Hunters course/program. Her long-term goal is to mentor students in the classroom and lab through high quality research experiences as well as to contribute novel scientific findings to our fields of study.

Conclusions and recommendations based on the EurBeST findings:

Selective breeding of honey bees is an efficient way to increase productivity, to reduce colony losses and to improve bee health. The use of well-selected stock is a major factor of economic success in commercial beekeeping.

Regional breeding structures are needed to select locally adapted bees. These include cooperation among breeders, queen producers and commercial beekeepers with scientific support.

Selection for resistance works, but it is costly. Mite infestation development and hygiene behaviour are useful criteria to select varroa-resistant stock. However, the costs of testing for the breeders are high and need to be compensated.

Market for queens must be improved. There is high demand from commercial beekeepers for resistance selected queens. However, the usual market prices for queens do not cover extra costs for selection. Subsidising the production of high quality queens could help.

Honey bee breeding needs support: The success of breeding programs depends on their dimension and consistent development over several years. Considering the high costs for specific selection methods towards improved varroa resistance, public funding of the beekeeping breeding sector is recommendable.

The results of the EurBeST study contribute to achieving the goals of the EU Green Deal, specifically of the Farm to Fork and Biodiversity strategies.

PROJECT TEAM

EurBeST
www.eurbest.eu

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www.llh.hessen.de

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RESTRUCTURING OF THE HONEY BEE CHAIN AND VARROA RESISTANCE BREEDING & SELECTION PROGRAMME

European Commission

AGRI-2017-0346
Directorate-General for Agriculture and Rural Development (DG AGRI)

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EurBeST

RESTRUCTURING OF THE HONEY BEE CHAIN AND VARROA RESISTANCE BREEDING & SELECTION PROGRAMME

A pilot study comparing varroa resistant bees under commercial beekeeping conditions

AGRI-2017-0346

European Commission

Directorate-General for Agriculture and Rural Development (DG AGRI)

The EurBeST study explores possibilities for increasing the varroa resistance of commercially available honey bees by selective breeding and analyses ways to improve beekeepers' access to resistant material.

Beekeeping: a small sector of huge importance!

The apicultural sector in Europe represents a limited market compared to other agricultural sectors, but the pollination services provided by beekeepers and their honey bees are essential to maintain healthy ecosystems and food production chains.

Honey bees are in trouble!

Honey bees have been under huge stress for several years, due to intensification of agricultural practices as well as climatic changes and globalisation, which bring new diseases to bees. Amongst them is the parasitic mite *Varroa destructor*, which leads to the death of most infested colonies within a few months if no treatment is performed by beekeepers.

The varroa mite: a deadly menace for European honey bees

This mite feeds on the adult bees and bee pupae and, during this process, can transmit viruses. Since its arrival in Europe in the late 70's, varroa infests most colonies and represents the most impacting pathogen threat for honey bees and the beekeeping industry worldwide.

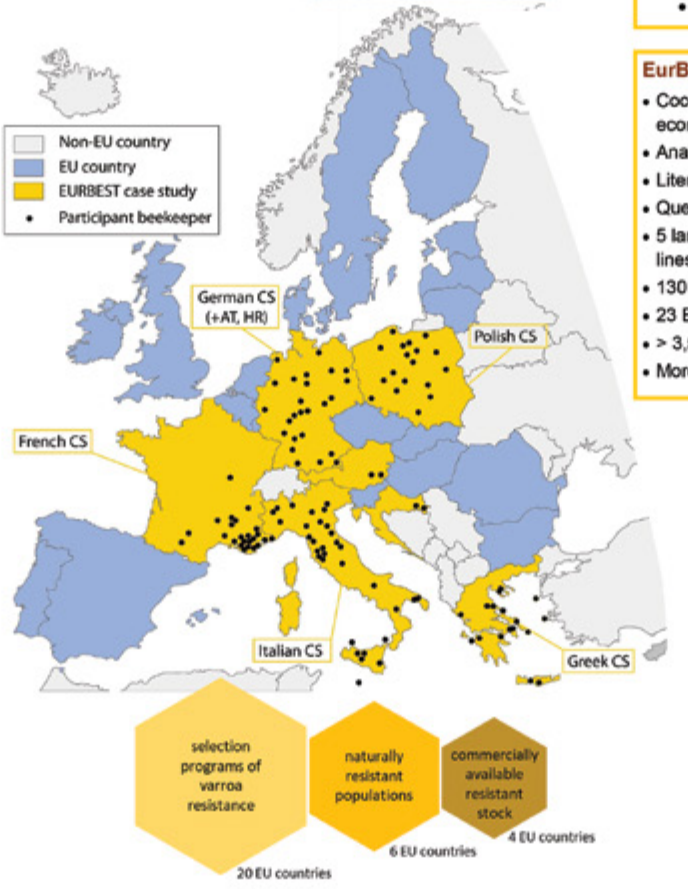
Varroa-resistant bees, a sustainable prospect for beekeepers!

Beekeepers only have limited solutions to control the mite. A new promising and sustainable solution emerges: some honey bee populations are able to survive mite infestation, in the absence of treatments. These survivor bees develop defences to maintain the parasite population under control. As this ability can be transmitted to the next generation, it opens up the possibility for beekeepers to specifically select and breed for varroa-resistant bees.

EurBeST

The largest study on honey bee selection ever conducted in Europe, to answer the following questions:

- What is the status and entity of the honey bee breeding and reproduction market in the EU?
- What is known about varroa resistance? Do varroa-resistant bees exist in the EU? Are they available for beekeepers to use?
- Are beekeepers interested in using varroa-resistant honey bees? What do they expect when they buy honey bee queens?
- What methods are available for selecting varroa-resistant bees? Do they work?
- What are the efforts and costs to obtain varroa-resistant honey bee stock?

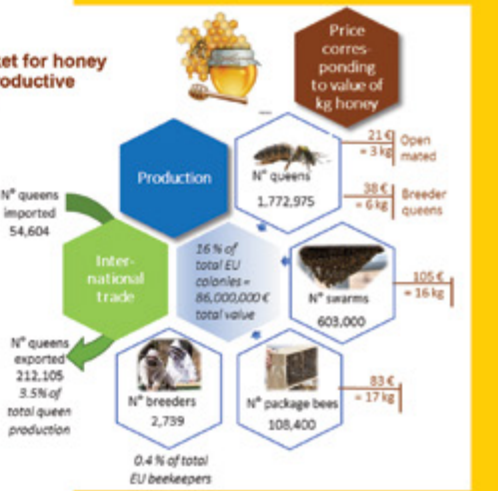


Despite a high demand, availability of varroa-resistant stock is limited

EurBeST team and study design

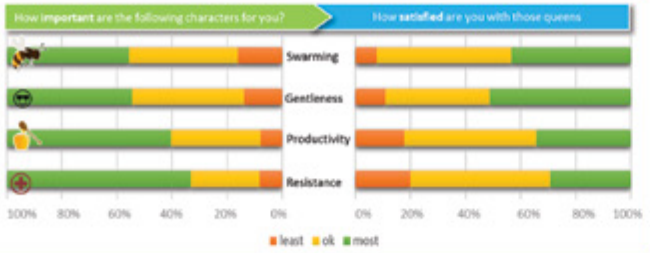
- Coordinating body with experts in beekeeping, bee biology, breeding, economics and statistics
- Analysis of the EU market for honey bee reproductive material
- Literature review and expert interviews on the state of play in varroa resistance
- Queen customer survey on expectations and quality
- 5 large-scale case studies (CS) in 7 EU countries comparing varroa-resistant lines under commercial beekeeping conditions
- 130 participating beekeepers
- 23 EurBeST selected lines belonging to 6 subspecies / races
- > 3,500 colonies tested for one full beekeeping season
- More than 40,000 single records collected

EU market for honey bee reproductive material



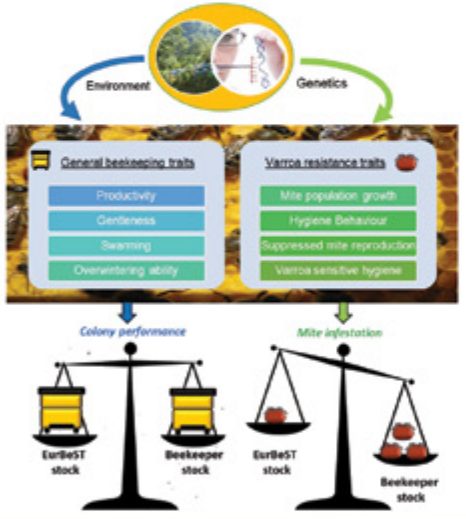
Beekeepers' views on the queen market: high expectations, but moderate satisfaction

- Most important for beekeepers is to have disease-resistant colonies, followed by a good productivity.
- Beekeepers are least satisfied with the disease resistance of available stock.



Local adaptation is important

Strong interactions between genetic and environmental factors regulate honey bee colony general performance as well as varroa-resistance potential. Practically, the same line of bees used in two different locations may perform very differently, highlighting the need for local selection strategies.

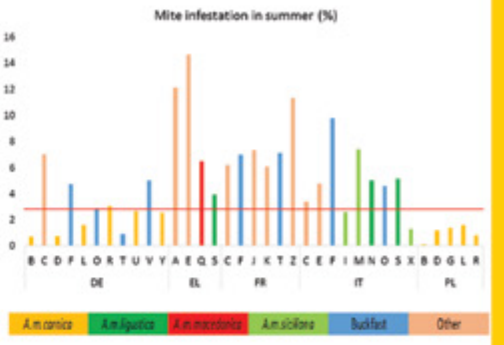


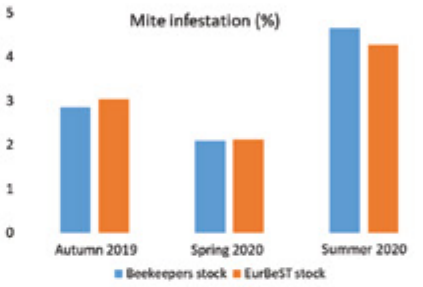
Selection works!

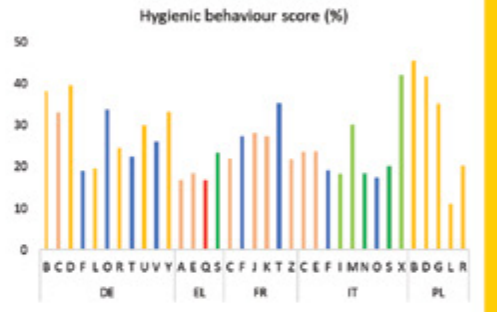
The EurBeST selected lines show similar survival rates to the beekeepers' stocks. While there is not much difference on average for the general traits, the EurBeST lines clearly outperform the commercial beekeepers' own stock with regard to mite resistance. Some of the selected lines demonstrated high productivity combined with low varroa infestation.

Higher resistance of selected stock

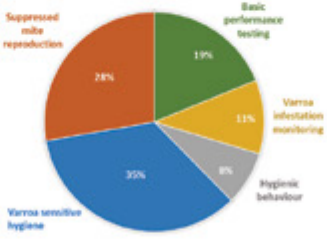
- While starting with a trend of higher infestation in autumn 2019, the EurBeST lines were on average less infested compared to commercial beekeepers' own stock by the end of test season in summer 2020.
- After a full season without any treatment against varroa, the infestation of several lines clearly remained below the 3% infestation threshold for required mite treatment, showing promising avenues for a treatment-free beekeeping.
- Varroa infestation levels closely correlate with the bee colonies' hygiene behaviour. Different expression of hygiene behaviour among the EurBeST lines thus serves as a useful selection criterion for mite resistance.







Economic Aspects



Selection is expensive...

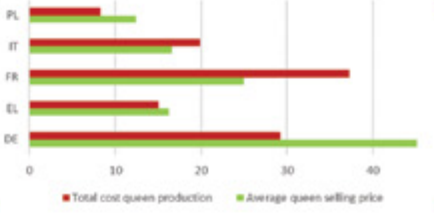
Testing a colony costs 193 € on average, ranging from 273 € in Germany to 85 € in Greece.

... especially selection for varroa resistance!

The main costs of colony evaluation derive from assessing varroa resistance traits. Varroa infestation monitoring and hygienic behaviour testing together reach almost 20%, while more than 60% of the total results from assessing specific traits of bee defense against varroa.

Queen prices often do not cover these costs!

The average costs for queen production across the study countries amount to 22.58 € per queen, with the main share of costs originating from labour, which significantly varies between countries. The average selling price per queen was 23.32 €.



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Are Honey Bees An Environmental Problem?

Save The Honey Bees

In the 1970s the battle cry of environmental conservationists was "save the whales." Today it's "Save the honey bees." Honey bees benefit the environment through pollination and beekeepers have become heroes of nature conservation: at least that's the common perception of the public if the majority of press reports on honey bees and beekeeping are to be believed. However, there is another perspective that has been gaining traction which paints the honey bee and their keepers as an environmental problem that contributes to the serious loss of biodiversity being observed among wild pollinators and plants. Keeping bees to save pollinators has been compared to farming chickens to save wild birds.

What does the science say?

The basis for much of the maligning of the honey bee is contained in a 2017 review of the literature which looked at three areas of potential impact: competition for floral and nesting resources; changes to plant communities; and transmission of pathogens. The authors went on to conclude: "The majority of reviewed studies reported negative effects of managed bees, but trends differed across topical areas. Of studies examining competition, results were highly variable with 53% reporting negative effects on wild bees, while 28% reported no effects and 19% reported mixed effects (varying with the bee species or variables examined). Equal numbers of studies examining plant communities reported positive (36%) and negative (36%) effects, with the remainder reporting no or mixed effects. Finally, the majority of studies on pathogen transmission (70%) reported potential negative effects of managed bees on wild bees. However, most studies across all topical areas documented the potential for impact (e.g. reporting the occurrence of competition or pathogens), but did not measure direct effects on wild bee fitness, abundance, or diversity. Furthermore, we found that results varied depending on whether managed bees were in their native or non-native range; managed bees within their native range had lesser competitive effects, but potentially greater effects on wild bees via pathogen transmission." (Mallinger et al. 2017)

More recent research does little to resolve the question of whether managed honey bees are harmful to the environment. One study found that just like our door knobs, honey bees can spread viral pathogens to the flowers they visit which then have the potential to be picked up by wild pollinators (Alger et. al. 2019), although researchers were unable to detect disease spread from infected flowers to wild pollinators when they looked for it.

Another 2019 study utilized the Canary Islands to observe how the introduction of up to 2700 hives of bees to take advantage of the forage each spring, impacts native pollinators and the reproductive success of the island's plants. (Valido et. al. 2019) Diversity of wild pollinators was reduced as was the reproductive success of the plants that were highly visited by honey bees indicating that native pollinators were deterred within high density managed honey bee areas and plants suffered since wild pollinators are often more efficient pollinators than honey bees.

Competitive Advantages

When a colony of 30,000 or more honey bees is brought into an area, clearly the number of foraging pollinators is greatly increased and the honey bees will frequently visit a large number of plant species. However, competition among pollinators is not a simple and straightforward thing. Native pollinators will often fly when honey bees don't (think rain, cold or at night). In addition, there are plants with nectaries so deep in the base of the flower's stamen that only native pollinators can reach the nectar they hold due to their longer tongues (proboscis). Such circumstances give native pollinators an edge to help mitigate the honey bee colony's advantage in numbers.

Honey bees are generalists when it comes to pollination and many native plants have evolved to require pollination from specific pollinators. Some blossoms are too small or otherwise structured in such way to prohibit honey bee access while allowing easy entry by native pollinators.

Invasive Species

One argument used to characterize bees as environmental pests revolves around the honey bees' tendency to visit species deemed invasive, thereby increasing invasive species numbers through their pollination work. Many of the invasive (and not so invasive) species found

throughout our landscapes are old-world plants that honey bees are really good at pollinating since they evolved together. Thus, the invasive species argument has some truth but also overlooks the fact that not only are European honey bees not native to North America, but so are we humans of European descent. In the quest for profits, our global economy moves species around the planet, sometimes consciously, but too often by accident. At what point does an invasive become so normalized, widespread and established for such a length of time that it is no longer an invasive and has become part of the natural ecosystem? At minimum, honey bees have been present in North America for almost 500 years (1622). How long will it take for the plants and animals in the new world to adapt and evolve to the presence and impact of bees to the point where it becomes the new normal? This is an open question that probably varies with species and location. Clearly as the Canary Island study indicates, there is an impact when bees are not a permanent feature and are moved into an ecosystem where they have not been present, but is the honey bees' impact in North America the same? I don't think we know and therefore it is premature to get depressed over the situation.

Part of the reason invasive species have become an important food source for pollinators like honey bees is not just due to the abundance of invasives but from a shallow understanding of the intricate and interrelated character of nature's ecosystems. Many of the activities the world's economic engine encourages and supports has so destabilized the natural environment that native populations have become stressed which provides additional opportunities for invasive species to proliferate. This begs the question: Are bees the problem here, or are we?

Underlying causes

The reason native bees and pollinators generally are in such dire straits is because we don't have an army of people out there raising them, feeding them, treating them when they are sick, etc. The reduced native pollinator numbers are caused by many of the same challenges our honey bees face: pesticide poisoning, commercial land development and agricultural practices that reduce forage availability and habitat. As *Bee Culture's* editor likes to point out, American's maintain roughly 50 million acres of suburban lawns with about 18 million pounds of chemicals and 10,000 gallons of water to keep them looking like the 18th hole at Augusta. In addition, we've paved the ground with approximately 48 million acres of asphalt which when added to the pests and diseases, extreme weather events due to our destabilized climate, and the reduced nutritional content of forage resulting from the dramatic increase in carbon-dioxide levels in the earth's atmosphere all add to the stress load of the world's pollinators. Unfortunately, our economic system doesn't necessarily provide what is best for society and the environment, instead we get what people can make money doing and since our industrial agricultural system requires honey bees for pollination and is willing to pay, the honey bee tends to take precedence. Just as wild pollinators are negatively impacted by many of the same issues facing honey bees, efforts to help the honey bee generally also benefit wild pollinators although native pollinators would absolutely benefit more if resources were put to work to help them more directly.

How many colonies of honey bees can an area handle before the bees become an environmental nuisance?"

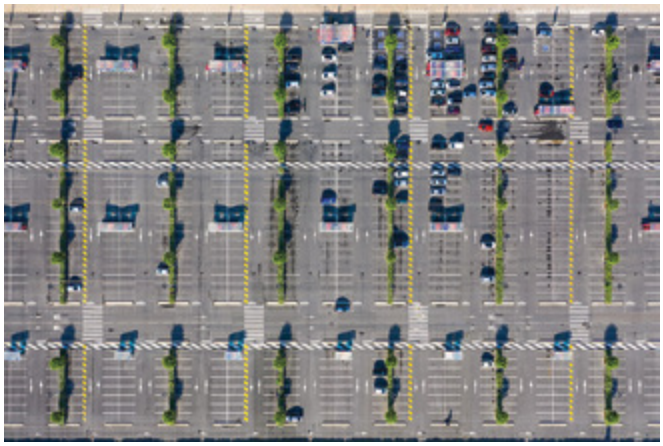
Exploiting the issue

The general public is often encouraged to help our beleaguered pollinators by planting pollinator forage and eliminating pesticide use. Well-meaning and concerned members of the public are seeking education and want to take action to help, but they end up being manipulated by businesses and organizations looking to generate sales of seeds and plants or donations for pollinator protection campaigns. While I don't mean to disparage such actions since the cumulative impact of millions of people taking pollinator friendly actions can be significant, the reality is that the greatest amount of pesticide use and loss of habitat and forage that needs addressing is a result of industrial agricultural practices, and lawn and golf-course maintenance.

We in the beekeeping industry are just as guilty of this self-serving exploitation when we suggest that the public can help "save" the pollinators by supporting their local beekeepers or becoming beekeepers themselves. The only pollinator that such actions have the potential to help is the honey bee, and even then, depending on their commitment to learning and practicing good bee husbandry, beekeepers can be more of a detriment than benefit to honey bees.

How did beekeepers become part of the problem?

Whenever anything is done on a massive industrial scale significant new problems are created and that includes beekeeping. When conducted on a smaller, more human scale, the potential negative impacts that result from beekeeping appear to be largely



Pollinators are not helped when paved parking lots that prioritize cars over people and wildlife keep popping up like mushrooms after a heavy rain.

mitigated. But even with large scale commercial beekeeping, the concerns some have expressed over the damage honey bees may be doing to pollinator networks is symptomatic of what I often see these days. People seem to be getting so frustrated with the general devastated and impoverished state of our environment that they are easily sidetracked by issues that are not of primary importance. This unfortunately distracts them from being able to effectively deal with the issues that are most pressing. The biggest threats to pollinators and the natural world, as well as the continuation of organized human existence, is the burning of fossil fuels and production of greenhouse gases, the spreading of millions of tons of toxic chemical pesticides and industrial chemicals throughout the landscape annually, our failure to adequately limit the development and use of atomic weapons, and the growing efforts to weaken and destroy democratically elected governments around the world (as it is only the people in free democratic societies and systems who are able to influence policy makers and businesses in a way that will provide us with a realistic chance to adequately address the first three issues).

Sure, honey bees and beekeeping is not all great and wonderful. Everything has a down side, but in the context of what our priorities should be considering all the things we can choose to be worried about, beekeeping appears far down on my list. Any potential negative impact honey bees have on natural ecosystems only becomes a priority when individuals fail to see the larger picture and grasp the context within which today's apiculturist exists.

So, is the presence of managed honey bee colonies bad for wild pollinators and the plant species that rely on them? From the available science, the answer appears that they can be harmful, they can be beneficial, or they may be neutral, depending on the situation and conditions. We have to realize that everything in the world has an impact on everything else. Sometimes the influence is beneficial, sometimes it's harmful, sometimes it's so subtle we are not aware of the effects, but mostly we have much more important things to be concerned with.

Full disclosure: Years ago I chose to make beekeeping and bee-related educational activities my vocation, therefore I have a conflict of interest and despite my best intentions, I am biased in this matter; so take all this with a grain of salt.

Special thanks to Emily Lanxner and Genevieve Drutchas for providing much of the inspiration for this article. BC

Ross Conrad is author of *The Land of Milk and Honey: A history of beekeeping in Vermont* and *Natural Beekeeping: Organic approaches to modern apiculture.*

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John Henry 'Jack' Happ, 1922-2021

John Henry Happ, Sr., known as "Jack," to his family and friends, went to be with his Savior and his wife of 71 years, Ann on May 18, 2021. John was predeceased by his parents William Peter Happ and Mathilda Preisel Happ and was the youngest of 12 children who all predeceased him.

John was born in the hospital at Evanston, Illinois on November 4, 1922 and raised in Winnetka, Illinois graduating from New Trier High School and attended Northwestern University until he enlisted in the Army during WWII. He was a member of the 10th Mountain Division, 126th Mountain Engineer Battalion, Company B, and saw combat in Northern Italy, being awarded an EAME Campaign Medial with two Bronze Stars.

While stationed in Texas before being deployed to Italy, John met his wife Ann Michelle (nee Crow), in Austin, Texas and they were married on November 21, 1944.

He is survived by his son, Col. John Henry Happ, Jr. (USAF Retired), wife Carol Ann Happ, (nee Lucas) of College Station, Texas, son, Gregory W. Happ and wife Susan Anne Happ, (nee Gerbasi) of Medina, grandson, John Henry Happ, III, wife Nellie, and great-grandson, John Henry Happ, IV, of Spring, Texas. He is also survived by his many nephews, nieces, great nephews, and great nieces.

Upon his return from Italy and after WWII ended, he entered Texas Agricultural & Mechanical College (now Texas A&M University) and graduated in 1950 with a B.S. degree in Entomology with a minor in Apiculture. John's career after college led him into both public service and private business. Upon graduation from Texas A&M he served with the West Texas Plains Health Unit overseeing the installation and securing the public water system for Brownfield, Texas. In 1954, he left public service to join his brother-in-law, Johnny Crow, of Austin, Texas to jointly run the well-known Tower Restaurant and Bowling Alley in downtown Austin. While in Austin he maintained two commercial honeybee apiaries.

John returned to public service in 1958 to join the Texas State Health Department, serving as Senior Sanitarian for Galveston, Texas.

John, while in grade school, became interested in keeping honeybees. He subscribed to *Gleanings In Bee Culture*, an international magazine published by the A.I. Root Co. of Medina, Ohio. He was once caught reading *Gleanings* in class. Upon all his classmates laughing, his teacher, holding up the magazine, stated to the class they should not laugh because someday John might become editor of the magazine because of his love of beekeeping. His teacher's prediction was fulfilled when

John was offered the editorship of *Gleanings* in 1959, he accepted and moved his family to Medina from Galveston. "Jack" became a world authority on beekeeping and remained *Gleaning's* editor until 1972.

Utilizing his degree in Entomology, John formed the Professional Insect Control Company serving Medina County. In 1980, Jack desired to re-enter public service and ran for the office of Medina County Commissioner. John was elected and served three consecutive terms. During his tenure, he participated in many advancements that helped usher the County into its successful growth with sewer and water serving much of the county.

Besides managing Professional Insect Control Co., John co-owned Gallery Blue Art Gallery of Medina with his wife Ann. "Gallery Blue" located on West Liberty Street from 1973 to 1994 represented many of Northern Ohio's finest representational artists. After retiring in 1994, John and Ann moved to a three-acre home in Medina where John and Ann kept several hives of honey bees and annually extracted honey which they shared with their friends and family.

While at Texas A&M he served as captain of the fencing team and was awarded a varsity letter in the sport. John had a life-long love of classical music. During his adolescent years he learned to play the violin and in his late sixties he learned to play the cello, joining, and playing in a string quartet. He loved animals whether his beloved horse Nanette, he raised and trained while in high school, his recent rescue ponies, Nanette and Wild Honey and his faithful Sheltie, Willie.

John's 98 plus years were full of his interests – music, photography, carpentry, art, picture framing, amateur radio, and his love of keeping bees. But the true love of his life was his war bride, Ann, who he adored and shared his life and interests until her death in 2016. He was proud that his sons and his grandson became "Aggies" graduating from Texas A&M and that his great grandson has elected Texas A&M University for his college education.

John was admired for his expertise in Apiculture, combat service, public service, and his love of family. He added much to his family and those who were fortunate to know him.

The family held a private graveside service with military honors at Spring Grove Cemetery in Medina.

The family requests that in lieu of flowers, memorial donations in John's memory be made to Texas A&M University Former Students Association.

Godspeed John, a courageous American patriot and member of the "Greatest Generation."

Late Summer / Fall Blooming Plants

Connie **Krochmal**

The U.S. Honey Industry Report for 2020 was released by the United States Department of Agriculture. This was published in the May 2021 issue of *Bee Culture.* It listed the state of Florida as one of the top 10 honey producing states.

The state enjoys a very rich flora for bees. Much of that is due to the warm climate, which allows some species to bloom throughout the year. Details for some of the ones that bear flowers during the late Summer and Fall appear below.

Hibiscus *(Hibiscus spp.)* has appeared in previous articles. These are widely grown in Florida. Several late blooming species that weren't mentioned in the earlier article include the following.

Common rose mallow (*Hibiscus moscheutos)* is a cultivated European species that has naturalized in some areas. Typically found in wet sites, this vigorous perennial, six feet tall, features large white or pink blooms with red centers that can reach six inches in diameter.

This is sometimes called crimson eyed rose mallow. Flowering occurs from Summer through the Fall.

Great rose mallow (*Hibiscus grandiflorus)* is a six-foot-tall perennial native to the South. Occurring in damp areas, it is ideal for seaside gardens. Also called swamp rose mallow, this blooms the same time as common rose mallow. The flowers feature rose to pale pink petals and reddish centers.

All of the hibiscus species are good bee plants. Bees are fond of the flowers, which contain pollen and nectar. The abundant nectar is easily accessible to bees. In tropical regions, hibiscus are major sources of a water-white honey that tends to granulate rapidly.

Thorny elaeagnus (*Elaeagnus pungens)* is related to the invasive Russian olive. Hardy to zone six, this widely grown evergreen has a very fast growth rate. Very easy to grow, it adapts to most soils and growing conditions.

The plant withstands air pollution and salt spray. Named for the spiny branches, thorny elaeagnus can be twelve to fifteen feet tall and wide.

This shrub bears small, dangling, tubular blossoms, ½ inch long. With an intensely sweet, gardenia-like scent, the silvery white flowers open in trios from the leaf axils in very late Summer and Fall for several months, typically October and November. Bees collect nectar and pollen from all elaeagnus blossoms.

Although I've written about **marigolds** (*Tagetes spp.)* earlier, one species I didn't mention does beautifully in Florida gardens year-round. **Sweet marigold** (*Tagetes lucida)* is a one to two foot tall perennial in warm climates. Also called Mexican tarragon, it bears golden yellow blossoms. Seeds are available from Richters.

All species of marigolds are good nectar and pollen sources. There usually aren't enough of the flowers for a pure marigold honey.

At least two species of **prickly pear** (*Opuntia spp.)* are native to Florida. *Opuntia humifusa* is known simply as prickly pear, and can bloom year-round. This species is by far the most widespread species for it is found from Montana to Massachusetts south to Florida westward to Texas.

Found throughout Florida, it bears very showy, vivid yellow, solitary blossoms. This does well in coastal areas.

All species of prickly pears are excellent nectar and pollen plants. Bees eagerly work prickly pear blossoms. These provide a surplus crop of honey with eighty-five pounds or so per colony every third or fourth year.

The light amber honey is initially strong flavored, but it becomes mellow with age. Heavy bodied with a stringy texture, this develops large, suspended crystals.

A number of **milkweeds** are native to Florida. **Butterfly weed** (*Asclepias tuberosa)* is the most common milkweed and bears the showiest blossoms. Native to Florida and most other lower 48 states, the long lived plant lacks the milky sap found in other milkweeds.

Butterfly weed reaches three feet in height with

Great Rose mallow

Sweet Marigold

Prickly pear.

a spread of about two feet. In Florida, flowering can extend from Spring into the Fall months. The blooms are mostly orange or red, but are sometimes yellow, orange, or orangish-green. These form compact, dense clusters or umbels mainly from the leaf axils.

This drought tolerant species is easier to grow from seed than most milkweeds. The flowers can bring very good honey crops annually even during rainy or dry seasons. Nectar flows continue throughout the daylight hours.

While I've written about **phloxes** before, one species that wasn't included is native to Florida. **Florida phlox** (*Phlox floridana)* is a long blooming perennial that can reach a foot in height. The lovely pink blossoms appear from Spring into Fall. All of the phlox species are excellent sources of pollen for bees.

As a group, the **sages** have been covered in earlier articles. However, there is one species that performs beautifully year-round in Florida. It is also suitable for coastal and tropical areas of the South.

Pineapple sage (*Salvia elegans)* is extremely popular among all pollinators. For best results, provide it with partial shade. The plant grows three to four feet in height with a matching spread.

This is named for the pineapple-like scent of the foliage. The vivid, red flowers, 1½ inch long, form loose clusters. The flowering period can extend from late Autumn into Spring in warm climates. In other areas, the blooms emerge during late Summer through the Fall.

All of the sages are good sources of pollen and nectar. They generally bring fairly small honey crops. However, in California two hundred pounds of honey per colony in a good year can result.

This honey is mostly very light colored – usually water white to pale amber or pale yellow. Tending to be heavy bodied, it is slow to granulate. This delightfully aromatic, premium honey has a mild flavor.

Other late blooming bee plants in Florida include various St. John's worts, butterfly bush, holly osmanthus, assorted camellias, black eyed susans, sneezeweeds, many-flowered sunflower, summersweet, loquat, coral vine, basil, eupatoriums, Chinese sumac, myrtle, Tatarian aster, chaste tree, and bluecurls.

Mexican Clovers (*Richardia spp.)*

The following species haven't been featured in previous articles. Members of the madder family, these are related to coffee. Despite the common name, they aren't true clovers and aren't all originally from Mexico. About ten species are mostly native to South America.

The bloom time varies slightly, according to the location. In South Carolina, plants in the central area of the state continue blooming until mid-November. In the coastal plain, this blooms into mid-September.

In North and Central Florida, flowering occurs from April through November, while in South Florida this can bloom a month earlier.

A number of these species have naturalized in America. Only one is native to North America. Some of the species recommended for bees are featured below.

General Description of Mexican Clover

Mostly annuals, they're sometimes perennials. The hairy stems can be two feet or more in length.

The leaves, which are usually lanceolate to elliptic, are connected by stipules. They reach three inches in length. The petioles are largely nonexistent.

The flowers are mostly white, but sometimes pink. These form dense terminal clusters or cymes. The funnel-like, white corolla has four to eight lobes.

The fruit, which doesn't split when dry, features three or four sections, each containing a single seed.

Largeflowered Mexican Clover (*Richardia grandiflora)*

Introduced from Brazil, largeflowered Mexican clover became established in Florida in vacant lots, disturbed sites, and lawns. The plant can be annual or perennial.

It shows some drought tolerance. Hardy to zones eight through eleven, the fast growing species grows to form a foot tall clump. The spreading, rough stems are hairy. The rough, opposite, medium green leaves, ¾ inch long, are elliptic to lanceolate.

Thriving in full sun to part shade, this bears blooms that are much larger and more showy than those of

Pineapple Sage

tropical Mexican clover. Emerging from Summer through the Fall, the sessile blooms form terminal clusters.

The pinkish to lilac blooms, ¾ inch long, feature six lobes. Plants growing in full shade bear darker colored blooms.

Prairie Mexican Clover (*Richardia tricocca)*

This perennial species is native to Texas and Louisiana. It pretty much resembles rough Mexican clover. Both have a spreading growth habit and a woody rootstock. The difference between the two is that this has fewer calyx lobes, only four to six, which is less than rough Mexican clover. Both feature white, funnel-like corollas.

The Latin species name refers to the smooth, flat, trilobed seed capsule.

Rough Mexican Clover (*Richardia scabra)*

Also called Spanish clover and Florida clover, rough Mexican clover was introduced from South America into Florida in the 1830s. It has naturalized all along the Gulf region from Texas to Florida northward into Indiana, Arkansas, Virginia, Maryland, and New Jersey. The quick blooming annual occurs in cultivated fields, pastures, roadsides, railroad tracks, waste places, pine woods, and savannahs.

The loosely branched plant bears succulent, leafy, erect or wide spreading, red tinged, hairy stems. They're typically two to three feet in length and spread in all directions, covering the ground.

The fleshy, opposite leaves can be elliptic, oblong or ovate-lanceolate. They're three inches long. At the base, these have sheaths or stipules. Both the common name and the Latin species name refers to the roughness of the foliage.

The small, star-like, white flowers form clusters or flower heads near the ends of the stems. The funnel-shaped flowers, ½ inch long, contain four to six narrow lobes with four to six stamens. The flower lobes, which are united only at the base, extend past the stamens.

Popular among pollinators, the flowers appear from May to frost, depending on the location. These open in the morning and close in the evening. The fruit is less than ¼ inch long.

Rough Mexican clover serves as a major bee plant in Florida after the citrus blooms. This is also an important bee plant in Georgia during late Summer and Fall. With a tart, rather characteristic flavor, the honey is normally used as Winter feed for the bees.

According to Jonathan Periam, author of "The Home and Farm Manual," originally published in 1884, this plant was initially considered to be a weed in cultivated fields until farmers realized it could serve as forage, green manure, and as a cover crop. Horses and cattle love the hay.

South American Mexican Clover (*Richardia humistrata)*

Native to South America, this annual or perennial has become established in New Jersey, Florida, Alabama, and Mississippi. It can be found in open grassy areas and disturbed sites.

South American Mexican clover spreads very quickly. Forming a thick mat, the stems are three feet long. These root at the nodes.

The oval, pointed leaves are up to eight inches long. Both the stems and leaves are hairy.

Borne in clusters, the flowers contain four petals. As the blossoms age, the bracts turn darker. Basically, South American Mexican clover looks very much like tropical Mexican clover with the difference being the latter has bracted blooms with six petals and the stems are longer – 1¼ feet.

Tropical Mexican Clover (*Richardia brasiliensis)*

Tropical Mexican clover has naturalized in Pennsylvania, New Jersey and Tennessee, and from Virginia to Florida westward to Texas. It occurs in fields, waste places, roadsides, and pine woods.

An annual that can become perennial in some locations, the plant arises from a deep rooted, gnarled, thick, woody taproot. Forming a mat, the much branched, hairy stems, which can be erect or prostrate, are a foot long. The opposite, oval leaves reach 2½ inches in length.

The crowded flower clusters can contain 20 or more blossoms. These are pinkish-rose or white. Flowering extends from May until frost, depending on location. The plant reportedly yields less nectar than some related species.

Bee Value of Mexican Clovers

All of the Mexican clovers are major nectar and pollen plants in the Southeast partly due to the long blooming period. Bees love the flowers.

Mexican clover blossoms are very rich in nectar. The plants can bring 50 pounds of honey per colony. The light amber, heavy bodied honey with a pleasing flavor tends to granulate rapidly. BC

Connie Krochmal is a plant expert and long time beekeeper living in Kentucky.

Change Is Constant

USDA "Grand Challenge"

John **Miller**

On Monday, May 17 & Tuesday, May 18, 2021, USDA sponsored an event titled:

"USDA Grand Challenge Workshop: Creating pollinator landscapes and beekeeping practices for a changing climate."

The meeting was a virtual event with invitations to 125 or so leading bee-affiliated scientists, university folks, a smattering of beekeepers, and USDA policy development personnel.

Over two days, attendees presented and participated in plenary sessions and breakout sessions. During breakout sessions, smaller groups reflected and shared impressions gathered during presentations.

It reminded me of a February, 2020 UC Davis gathering, a smaller, more focused event – sponsored by Project Apis m., and the Almond Board. PAm is already doing a lot of Grand Challenge type work. [I am a volunteer Board Member on Project Apis m.]

Bee meetings can sometimes be raucous affairs, with strongly held views thrashed out during discussions and business meetings. Such was less the case with this group:

Our Grand Challenge guidelines were:

"Balance the big picture and the details – Keep pollinator health as a key goal; offer specific, concrete RESEARCH and SCIENCE ideas to help achieve it. Conversations should relate to pollinator research in the agricultural or apicultural realm and to the specific research objectives under discussion.

This is not a policy discussion – It is a focus on RESEARCH and SCIENCE priorities. It is, however acceptable and encouraged to discuss needed research that could better inform policy decisions.

This is not a Federal Advisory Committee – There will be no voting or consensus-seeking. Rather, the intent is to capture a diverse range of perspectives and ideas.

Engage – Inquire, share, contribute; listen.

Be empathetic – Assume good intent; disagree respectfully.

Create common understanding – Clarify technical terms and acronyms.

Share screen/airtime – Be mindful of question/comment length.

Drs. Gloria DeGrandi-Hoffman and Kevin Hackett USDA-ARS were the leads for the event.

Topics included: Climate Change, Seed Mixtures for Pollinator Nutrition and Bee-pollinated Crops, Overwintering Colonies in Storage Buildings, and Improving Honey bee Nutrition.

What struck me was the assembled talent and that from my desk, in a remote part of a sparsely populated state, I could link with [up to] 125 other attendees all of whom were well-qualified to address topics in discussion. Assembling a similar group in any beekeeping organization venue in America is now possible – remotely. The mixed blessing of a pandemic is it forces us to think, and act, and gather, and apply information differently.

The drudgery of schlepping airports to present to a group of 60 earnestly focused beekeepers – burning three days in so doing – is no longer how we share, gather and apply information.

The remarkable inflection point of 2020 changed how meetings are created, populated, subject matter discussed – and action items implemented.

But, there is a problem with all this enlightenment and it isn't new.

Meetings are held. 125 attendees all want to participate to ensure their relevance, have their 'yeah but' comment heard – detracting from – for example, Clint Otto's presentation. For years, Dr. Otto's well-researched work on seed mixes performance benefiting honey bees has been in demonstration. Yet, incredibly, USDA persists with CRP seed mixes that are more expensive, less productive, support fewer species – and awaits adoption. The 'yeah buts' take form as 'how bout the native bees?'

Let's look at that a bit: USDA policy is to pave America with corn and beans. That policy discs up marginally productive ground where solitary bee habitat may exist. Honey bees – our honey bees are the unquestioned global pollination champion. The solitary bees, whether native to Europe, Asia, South America, does not matter – contribute an infinitesimal benefit to modern food and fiber production. Remember, say Blue Orchard Bees?

To take things another step, consider the USDA behemoth. The task at USDA is to investigate everything from fish to fir trees, insects to poultry packing, all in service to USA Food Security.

Is it a surprise to anyone that well-intended & malignant efforts are at cross currents with common sense beekeeping? Who is opposed to more flowers? USDA. Who supports more flowers? USDA.

Are you confused? I am.

This Grand Challenge unleashed a torrent of ideas. Here is one: The lead presentation was Climate Projections. Great. We all want to live in a Safe Climate. What is the historical reference point for a safe climate? How far have we wandered from a safe climate? Is it possible to go back to & does anyone want: No planes, trains, refrigeration, electricity, antibiotics, transistors and automobiles?

Appreciation and Thanks are in order for the Grand Challenge Event. From the distilled presentations and comments, a report will emerge. The big picture and the details will be covered. No policy will develop, nor will a federal committee advise anyone. The engaged, empathetic, sharing participants behaved well. At the end of the day, I am conflicted, and grateful for the chance to participate.

Beekeeping is an ancient practice. We occupy a rapidly changing agriculture landscape. Technology is forced on us for both good and bad. Some embrace it and may benefit from it.

The thing I keep in mind is this: Project Apis m. is already funding and driving the research on the above ideas. Our staff of five does exceptional work. Our Scientific Advisors are second to none. The challenge to PAm Board Members is to seek ideas and technology that hasn't been invented yet. PAm Board members can't see around corners; but look around the industry. Who else is driving and funding the bee research in America? Several State beekeeping groups fund research. National Honey Board funds research, through PAm. Some remarkable bee clubs send much appreciated donations…to PAm. The constant? PAm. BC

BUILDING A BEE OPERATION

Ed **Simon**

You Can Do It!

When Jerry Hayes, editor of *Bee Culture*, informed its readers that the 2022 calendar was going to feature homemade bee equipment, I was ecstatic! Well maybe that is going a little overboard, but I was happy. There is an ever-expanding group of beekeepers that enjoy making and developing new equipment for the hobby. In September 2008, I had my first article published in *Bee Culture*. Since then, *Bee Culture* has published a minimum of 34 articles about making your own beekeeping equipment. Consequently, I have received thanks for the articles and even suggestions as what to work on next. What is most satisfying is that an idea or method presented often leads to the reader using the idea as a base and then improving it or modifying it to their specific needs.

Over the years homemade equipment has become routine in its use and integrated into my way of beekeeping. The following is a short synopsis of some of these pieces of equipment. They will be presented based on the time of year that they are useful.

A list of all the *Bee Culture's* "Build a …" articles is included for your reference.

Dumpster Diving – *Bee Culture* Sept. 2009 p.45

Although this is not about building something, it is extremely important to many beekeepers who wish to keep the cost of their hobby under control. It is also fun. (I guess I am a little weird.)

When I started beekeeping, I had been retired for a year and needed something to do. So, why not make the equipment for the hobby? I had the woodworking equipment but not enough knowledge to decide what was really needed. I took the safe and easy path by deciding to build hive bodies. This requires a lot of wood, and wood was and still is expensive. Having always been a scrounger and living in an area that always seemed to have construction activity, I developed a route that passed many construction dumpsters. WHAT A BONUS! Wood was plentiful. You just needed to be there at the right time. It was **FREE**! If you didn't take it, the contractor had to pay for its disposal. My most plentiful source was a lumber yard. They even helped me by setting aside unusable pieces that they were tossing away. After 20 years I am still scrounging. My latest find is a kitchen remodeler that has used deep stainless sinks that I can use for converting into uncapping tanks. The total cost for an unlimited supply of these used (scrap) sinks was one jar of cinnamon creamed honey. Later in the week a supply of angle iron (old bed support rails) was obtained for three bears of honey from a mattress sales business. These will be used to build supports for the uncapping sinks.

1.

Use Jigs. – *Bee Culture* Sept. 2009 and Jan. 2013

When making multiples of anything, use a jig. If you are drilling holes three inches apart, making hive bodies or making frames, a jig adds to the repeatability and ease of operation. Two jigs that were published years ago and are still being used are the "Super Jig" (Sept. 2008) and the "Frame Jig – multiple" (Jan. 2013 p.46).

Last year alone the super jig was used make 220 hive bodies and the frame jig helped assemble 2200 frames.

Build Hive Bodies – *Bee Culture* Feb. 2014

Winter is the time to stock up. When it is -10 degrees F, you can perform miracles in your heated basement workshop. Currently (2021 prices) an unassembled "Budget" honey super retails for $20.00, and this does not include shipping. You do need the equipment to construct the boxes, but the savings can be significant and depending on the volume, easily pay for the equipment. Additional savings can be had by getting free

paint for the hive bodies from the recycling center.

A few year ago, when a friend decided to expand his bee operation, we built two-hundred-twenty deep and medium hive bodies. It was a lot of work, but the savings was worth it.

Build a Migratory Top Cover – *Bee Culture* Sept. 2018 p.66

After considerable thought, you decide to step up from a hobbyist beekeeper and increase the number of your hives. Until now you have been building your own equipment and find it enjoyable, satisfying and less expensive than buying ready-made equipment. You know that increasing the number of hives will make a change in the way you both work your hives and how you build your equipment. The use of a migratory top helps in a couple ways. First it replaces the bulky telescoping top. Secondly it eliminates the need for an inner cover. And in addition, they are easy and cheaper to make.

Build a Feeder Jar Stand – *Bee Culture* Jan. 2015 p.45

Two hives and two feeders are not too expensive. But as your bee yard grows the feeder cost raises. You can build your own feeder stands for almost nothing. The cost of the jars depends on the availability of a local reuse store's supply of jars. These feeder stands are so cheap and easily made in volume, that you can give them away.

Hint: Frequently visiting the local Salvation Army, Habitat for Humanity Reuse store or Goodwill has its advantage. You never know what is available and what you can repurpose for your use in beekeeping. Last week I found a $5.95 electric kitchen knife which I plan on using to develop into an uncapper. Stay tuned, hopefully this idea will work, and you will be able to "Build a "Kitchen Knife Uncapper" yourself.

Feeders for Dry Supplements – *Bee Culture* May. 2021 p.43 – by Dwight Wells

A dry pollen feeder is easy to build and is of great importance in the spring when hives are expanding rapidly and the pollen supply can be unreliable. This style feeder is simple and cheap to buid. The placement of a screen over the entrance to the feeder is important. Eight years ago when we started using this style feeder, the birds (wrens) moved in immediately.

https://www.beeculture.com/category/2021/may-2021

Build a Swarm Trap – *Bee Equipment Essentials*

As the year progresses, the inevitable happens. Yes, it is swarming time. Early on, I was looking at bee escapes used in some pollen collectors and then I read an article on how to stop bees from returning to their colony in a house wall by deflecting them into another hive body with the use of a mesh cone. This cone allowed the bees to leave but stopped them from reentering. Why not use a wire funnel to guide the bees into a five-gallon pail. Once inside the pail they would not realize that the way out is through the little offset opening. Hence the five-gallon Swarm Trap. Inexpensive to build, it will get used almost every time you have a swam. Once the swarm, including the queen, is dumped into the pail, the lid is applied. The remainder of the swarm follows the pheromone through the funnel. The combination of a small offset opening and the light through the hardware cloth top prevent the bees from finding their way out of the trap.

http://wicwas.com/project/bee-equipment-essentials-20-00/

Build a Gargoyle – *Bee Culture* Jan. 2013 p.48

The hive gargoyle is a free option you can add to any of your hive bodies. It provides an insertion point for the hive tool. One minute of labor added for each hive body modified reduces the rot and eases the separation of hive bodies. It is free and it keeps working forever.

After recognizing the rotting location of most hive bodies was at the corners where hive tools left gouge marks, I removed a "V" section at the top corners of each hive body. You can remove this little "V" with a belt sander. Now when you place the hive tool into the "V" you will not gouge the wood. Easy simple and cost free, how could you ask for more!

Build a Frame Popper – *Bee Equipment Essentials*

Propolis and wax team up to keep you from moving the frames of honey from a super to the extractor. The first time I extracted, it seemed as though I spent more time trying to get the frames out of the super than I did removing the capping wax from the frames. Then something jogged my memory and I remembered seeing a beekeeper (before I was involved in the hobby) hit the hive body with his hand and all the frames rose above the edges of the box for easy selection. Hence the development of a "FRAME POPPER". This device has been used every year for the last 19 years to release a super full of frames at one time by applying pressure to the super's body. Last year frames containing over four tons of honey were released from their supers using this device.

http://wicwas.com/project/bee-equipment-essentials-20-00/

Build a Drip Tub – *Bee Culture* March. 2021 p.32

Extraction is messy. It involves moving frames of dripping honey from the uncapping device to the extractor and then back to a super. You need to be ready to load the extractor immediately after it is unloaded. This presents a problem because the waiting frames continually drip honey. A cheap easy solution for this temporary storage is the Drip Tub. Readily available and always on sale, a plastic storage container will meet your needs. Minimal additional parts and tools allow for containment and eventual recovery of the dripping honey. Off season, this same tub can hold the tools and supplies for convenient storage.

https://www.beeculture.com/category/2021/mar-2021/

Build a Drum Dolly – *Bee Culture* Oct. 2015 p.43

Six-hundred fifty pounds of honey fit into a 55-gallon drum. When a full drum needs to be moved, I cannot do it. But, if a 55-gallon drum decides that it wants to move, get out of the way. You probably cannot stop it and you may get hurt. After struggling with our first drum of honey, we decided for our own safety to build a heavy-duty dolly to move the drums. Once the drum was on the dolly, it was easy to move around. If you are planning to store your honey is drums, this dolly can save a lot of work and possibly a hernia.

Build an Observation Hive – *Bee Culture* Mar. 2014 p.42

A portable observation hive is a great sales item. When you have more honey than you can possibly use and your friends know they will get honey for any and all gift occasions, it is time to start selling it to strangers. Luckily, there was and still is a yearly flea-market, antique show in a nearby town of 900 people. For three days this town hosts 20 thousand to 25 thousand visitors a day and the

sightseers are willing to spend money. A 50-dollar fee rented a space, and I could sell bee products. To attract the customers, a two-frame observation hive was built. This observation hive was populated with brood frames full of workers and drones (no queen). It was an instant draw. Kids would drag their parents to the hive to watch the bees. Once they were enticed to the booth the parents would buy the local honey and the questions began. Occasionally, because the hive contained brood frames, some customers could watch a bee chewing it way out of its cell. BC

To access the online issues of *Bee Culture: (2019 issues to date)* Go to **https://www.beeculture.com**

Select the "LATEST ISSUES" tab.
Then click on the issue you wish to view.
Under the month - year banner, you will be presented with the statement:
"**Click here to access the web edition**"

Click on this option and the "online PDF Viewer will be loaded so you can access the issue.

Note: *The PDF page number is not the same as the printed issue page number. You may need to search a little to find the article. The PDF page number seems to be two to four pages greater than the printed page number.*

Bee Culture's calendar for 2022

Submit your pictures for the 2022 calendar featuring "Home Made Bee Equipment" NOW!

Submit them ASAP and follow the following guidelines:

Each induvial submission must include:
Name
Mailing Address
Phone Number

Each entry must be a single JPG image file attached to an email (not embedded in the email). Send your entry to: **Jerry@BeeCulture.com.** The deadline for submissions is October 1, 2021.

Articles mentioned in the "Build a …" list plus others are available in Ed's two published books. The first Bee Equipment Essentials *from* ***www.wicwas.com.*** *The second* Build Beekeeping Equipment *is available at* ***www.lulu.com****. Take the "Bookstore" option and search for "beekeeping". Ed can be contacted at* ***SimonEdwin41@gmail.com***

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BIGGER PICTURE

Jessica **Louque**

Extra Boxes Everywhere

Of all the things covered in our interview on the ***Beekeeping Today podcast***, the massive surplus of equipment was by far the most interesting to the listeners – at least based on response! Lots of people sent messages on Facebook, Instagram, email, or made the mistake of trying to come to our house (I'm not friendly in real life – this is just pretend). While we can't really sell or donate pretty much any of the equipment we use, we can occasionally get rid of equipment that was never used. Most of the time though it just becomes part of one more house project.

I think in the past, I have written about using old boxes and lids to make turkey pens and quail cages, bookcases and shoe racks, and a little in the garden. This year, we've finally had the chance to start working on the house so the old boxes are going straight to plants. Most of these are boxes that were either ravaged by bears and I keep as a reminder until I can reap revenge on said bear, or they are boxes that were partially repurposed as painting tables for projects and I liked the paint splatter effect.

I've always been an ag kid, but I didn't know permaculture was a thing until I went to college, and I took a couple classes. Permaculture was basically how everyone here did stuff anyway, but because they had to and not because they were trying to save the earth or be more mindful or anything like that. Necessity can be the mother of invention though, and agriculture is no different. Where we live, the soil is garbage. Actually, garbage could probably grow better plants without intervention. It is just rocky, clay – trash dirt. Basically, there's no topsoil to be found, and when I say rocks, I mean rocks the size of small cars. We've been working on amending the soil in some places but it's just awful. The bee boxes are great for the height because they can add so much nice soil to one spot, so it is hyper focused.

There are two schools of thought here for raised boxes or raised beds. French tilling is a lot of work but it is highly productive. This has been around for a very long time and is a little like beekeeping where you tweak it for your environment and what you are trying to accomplish. This method starts with tilling in compost to the soil at least a few inches deep and letting it sit to break down and add nutrients to the soil. Then, you used raised beds to add more soil. These normally need to be a 3x3 foot bed if you are attempting to maximize some sort of production, but everything is up to the grower. These can be as low or high as you want, with lower or even subsoil ones (anti-raised, I guess) can be used to harvest rainwater and hold it a little longer in arid environments, and a higher raised bed can drain well and also hold in more heat from the soil and compost breakdown. These are normally done with companion planting of some sort. This is a nice method of using plants to benefit your other plants. In a large scale, you can plant sunflowers with buckwheat so the buckwheat grows fast and can feed your bees, and the sunflowers will eventually keep them a little shaded so they last longer and then the buckwheat will reseed and you can either use it all for nitrogen in the soil or let it grow a second round of buckwheat. In a small raised bed, this is planting crops that grow well together to help attract pollinators, grow at different rates, or that affect taste or deter pests. These raised beds give you the option to fully control the soil type, amendments, and weed growth on a much more intensive scale than a normal garden.

The second idea here is more of a permaculture theory, supported by Charles Dowding for creating better soil systems. It's called no-till or no-dig gardening. This is slightly different than large-scale no-till agricultural practices, although some of the tenants overlap. With large machinery, no-till minimizes soil disruption, thereby reducing dust and erosion, and keeps in soil moisture. For no-dig, it's a lot easier for people who don't have the equipment or the ability to dig. In my particular case, I'm doing it because it will be good in long-term with less effort and I'm using this to mostly grow flowers that are just for here and not to sell or eat or – produce

income. It is also a good way to use all the shipping boxes that show up at the house, because you know, Bobby (obviously NOT ME) orders too much stuff on the internet. He may kill me if he reads this, sorry I love you (we all know it's me). He will only use regular cardboard in the garden, but I'm not that picky and will also use printed cardboard for my flowers. I flatten it out and then put my old bee boxes on top of it and fill it full of whatever soil I want. In some cases, you may want to use garden soil, but I'm not mixing this with anything and sometimes that is a little too hot without using it as an amendment in regular soil. You can use topsoil if you plan to eventually move the boxes and plant in the spot, but in this case, I just went with regular potting soil. On top of this, my godparents were nice enough to let us take a trailer full of mulch from some trees cut down on their property. The no-dig concept has one method of just putting down cardboard over normal land and mulching heavily and then planting the next year. This lets the cardboard and mulch naturally kill the weeds and break down in the soil, while not killing any beneficial worms or nematodes in the area and retains moisture. This is what we did in front of the house where the cana lilies go. We are finally on the cusp of getting rid of our old house and I dug up most of the lilies there to bring here. My fruit trees were too rooted to dig up, but the canas and some of the salvia were shallow enough to bring. We tilled a little in front of the porch on both sides of the front steps just to have enough depth to put the lilies in the soil and amended it. I put dahlias in bee boxes because they are so prone to fall down, but I want the lilies to spread faster than I want to move the bee boxes. Everything else around them we just covered with cardboard and a few inches of mulch. By next year it should be in a lot better shape to add some bushes. The dirt under the cardboard is so hard that the best we could do is just a few inches with a tiller on a 50 horsepower tractor.

The rest of the boxes are all around the house. I'm not sure if I've told the horror story of our house building nightmares, but everything that could go wrong did go wrong with our house, culminating with the suicide of the business owner before our house was complete. In the part that is relevant to bee boxes, one of the things that was left unfinished was the rock work around our foundation. Living in the foothills it is relatively easy to imagine that nothing is flat and part of our house has a lot more foundation than the other side. We currently just have a cinderblock/concrete foundation that was just waiting for the rockwork that will now probably never come. At the side door where our garage was supposed to be but is now just steps, I put in a 3x3 of bee boxes. This is the West side of the house, and only gets sun in the late afternoon. This is where the elephant ears, bleeding hearts, and caladiums went. The back of the house faces mostly North and doesn't really get any full sun. A line of six bee boxes is against the house on the Eastern, where the foundation is a few feet higher than the Western side. These have variegated camellias and more caladiums, where hopefully the camellias will cover most of the side

and give the bees some winter food. The Eastern side of the house has 5 more bee boxes, with hydrangeas and cana lilies, and loses full sunlight by around 12-1 pm. I am hoping that in the long run, I can either add more bee boxes or use them to line the entire foundation in plants that will grow up around it. It may be cutting off my nose to spite my face, but I don't want to pay twice for rockwork. Buying cabinet knobs that weren't installed and then buying them a second time and putting them on myself was irritating enough.

If you have problems with carrots, bee boxes are amazing because you can add so much depth for longer carrots. The other nice thing about bee boxes is that you can surround them with straw bales for insulation if you want to keep the soil warm longer, or even add plastic or hoops fairly easily. We may have an excess of 500 bee boxes, so there's a lot of gardening that needs to happen! BC

Apiary Inspection Michigan

Brooke **Decker**

Michigan agriculture, which is one of the most diverse in the nation, produces over 300 commercial agricultural commodities, nearly a third of which rely on Michigan beekeepers for pollination services. It is estimated there could be as many as 10,000 total beekeepers in the state managing between 150,000-175,000 colonies in the Summer months. Michigan's apiary industry has about 75 commercial beekeeping families. While Michigan does not have a formal Apiary Program, the current State Apiarist is housed in the Michigan Department of Agriculture and Rural Development's (MDARD) Pesticide and Plant Pest Management Division with a split appointment as a Plant Health Field Supervisor. The State Apiarist is responsible for inspection and issuance of health certificates for bees leaving the state of Michigan to those states where certificates are required. Additionally, MDARD issues *Certificates of Quarantine Compliance* for bees used for almond pollination in compliance with California's Voluntary Red Imported Fire Ant certification program.

Mike Hansen joined MDARD as a nursery inspector and regional apiary specialist in 1987; and became the State Apiarist in 1992. Mike has been active with the Apiary Inspectors of America since 1994 holding several officer positions. Currently, he is also a Plant Health Regional Supervisor for MDARD's Pesticide and Plant Pest Management Division in addition to his apiary responsibilities.

During his tenure, Mike has worked closely with MI State University's Dr. Roger Hoopingarner and Dr. John Harbo of United States Department of Agriculture's Baton Rouge Laboratory in the early development of the *Varroa* Sensitive Hygiene Bee. Mike served on Michigan's Right to Farm, Care of Farm Animals committee helping develop the Generally Accepted Management Practices for Beekeeping. He continues to work closely with apiculturists at MSU including Dr. Meghan Milbrath, Dr. Zachary Huang, Dr. Rufus Isaacs, Dr. Walter Pett, Dr. Adam Ingrao, and Extension Apiculturist Ana Heck on such projects as the Michigan Pollinator Initiative, Michigan's Managed Pollinator Protection Plan, and assists with MSU's "Bees for Veterinarians" Senior level course. BC

Rotating Old Comb And Tips And Techniques

David **MacFawn**

It is currently accepted that old brood comb should be rotated out of the brood chamber every five years. The general practice is to rotate two combs in a 10-frame hive every year. There are a couple of ways to rotate the comb out. Also, several tips and techniques are discussed that should be done periodically. This includes checking for *Varroa* mites and diseases.

In South Carolina and the southeast, after the spring nectar flow and when the queen starts to reduce her egg laying, June is an excellent time to rotate two center brood combs to the outside of the brood chamber into positions one and 10. The other frames are pushed toward the center. When any remaining brood hatches, the old combs in position one and ten can then be replaced with fresh frames with foundation. One concern with the timing of this procedure is it is difficult to get the bees to draw out the outside frames in June during a nectar dearth in South Carolina.

An alternative is to move two inside frames to positions one and 10 in a 10-frame hive in late August/early September time frame and replace with frames with foundation in the February or March time frame. This will result in the frames with foundation being drawn-out during the April to June Spring nectar flow.

The old comb to be rotated out are typically very dark wax with the cell size starting to shrink due to brood rearing. Brood comb that is just drawn out by the bees is lighter with the comb darkening with age. Darkening of comb is another way to tell when comb should be rotated out.

The frames can be labeled with the dates they were initially put into a hive with bees. Labeling the frames with dates when initially put into the beeyard can be misleading. Labeling dates with when bees are installed on the frames is more accurate and preferred.

Hives should be refurbished and painted approximately every eight to ten years in the southeast depending on initial paint quality. The woodenware hive should be washed with bleach to kill mold and mildew before refurbishing/repainting.

Keep hives up off the ground to improve the life of the hive woodenware and make it easier to inspect the hives. If solid bottom boards are used, the bottom board detritus/debris should be scraped clean in March in the southeast to prevent bottom board rot.

Varroa mites should be checked for monthly during Spring, Summer, and Fall in the southeast. If the mite level is more than 2% or more than six mites per 300 bees, treat for *Varroa* per the selected treatment manufacturer's label. Usually in the Spring the mite levels are all right since the bees are building up faster than the *Varroa* mites. Mites from dying colonies can invade a healthy colony rapidly during warm weather. Often in the Winter there are not enough bees to do an alcohol wash (a method to check mite levels – put 300 bees in alcohol, shake, and if have more than six mites, treat) so other varroa mite check methods may be in order. Normally, the same varroa mite check method should be used to allow comparison of results easily. If your *Varroa* levels are too high, you may end up with parasitic mite syndrome (PMS). Parasitic mite syndrome looks a lot like European Foulbrood and affects the larvae prior to capping [1,2,3].

How Often Should You Do This Really?

Check for small hive beetles monthly during warm weather. Place beetle traps in the hive if needed (usually more than 20 to 30 beetles) and treat soil around the hive with an approved drench like Guardstar. If hives are moved often, this helps keep the small hive beetles in control. Small hive beetles pupate in the soil. Keeping hives in morning and early afternoon sun in the southeast also assists in controlling small hive beetles. Also, consider using unscented "Swiffer" pads to catch small hive beetles. It should be noted if your hive has a lot of propolis buildup, Swiffer pads may stick to the propolis

Super with a lot of propolis.

White wax appearing on comb at start of nectar flow.

and result in the hive being difficult to separate. The bees keep small hive beetles in "jails," usually above the inner cover and other inaccessible hive locations. When you inspect a hive, often the beetles get out of these jails and you see them scurrying about the hive. You can eliminate the beetles with your hive tool.

Check for honey stores monthly during Summer, biweekly during cold weather, weekly in the Spring during bee buildup. Honey stores can be checked by lifting the rear of the hive or by visual inspection of the comb. A strong colony can go through a deep frame of honey easily in a week during Spring build-up, especially just prior to the nectar flow.

Put your honey supers on your hives at the first sign of a nectar flow. There are three ways to tell if a nectar flow is on:

1. New white wax, especially on the edges of the feed chamber super comb
2. Look in the cells for fresh new nectar
3. See the bees fly with a "sense of purpose," out of the hive and not languish around the hive entrance.

During a nectar flow, the bees will usually stop taking sugar syrup in favor of fresh nectar. However, if you place honey supers with drawn comb on your hive too early and feeding sugar syrup, the bees may store sugar syrup in your honey supers with the resulting frames having a mixture of sugar syrup and honey. This adulterated honey should not be sold.

Check for American Foulbrood (AFB) every time you go into the colony. There are several ways to check for AFB. AFB is usually detected after the brood cells are capped with punctured cell cappings, with the pupa darkening and it ropes out about an inch when a twig is placed in the infected cell. In severe cases a "pupal tongue" sticks up in the cell and the hive smells. AFB smell should not be mistaken for goldenrod in the fall. AFB is highly infectious. AFB forms a spore that will last for decades. Normally, the hive should be burned with all the frames and wax comb to prevent transmission. All hive tools and equipment such as frame grips and bee brushes should be sterilized by placing the hive tools in a lit smoker. All clothing should be washed and cleaned[1,2,3].

Check for European Foulbrood (EFB), chalkbrood, other diseases every time you go into the colony. EFB appears as a larvae disease with the larvae turning brown to black. It does not form a spore like AFB and usually clears up during a nectar flow. Chalkbrood is detected as harden white or gray "mummies." The colony should be requeened and removed from any damp or moist areas.[1,2,3].

In South Carolina and the southeast, you should feed your bees in the autumn, if needed (less than 50 pounds of honey produced in the southeast), to ensure the colony has enough "honey" or carbohydrates in the spring. If the colony is light, it should be fed no later than mid-September. Mid-September is when the bees store the sugar syrup strategically in the colony for the Winter. The syrup is stored in the brood chamber and above the brood nest. After about the first frost, the colony will stop storing syrup and leave it in the feeder. It is preferred to feed a light colony in the Autumn rather than having to feed a lot in the following late Winter and Spring. However, some years and seasons the colony may have to be fed in the Spring. A light colony is one input into the decision to either combine colonies if both colonies are disease free. You need to determine why the colony is light. Did you harvest too much honey in the spring with the resulting light colony due to the summer dearth in the southeast? Did the colony fail to build up correctly in the spring due to a poor queen or was the colony a split from the spring that did not store enough honey?

Brood comb should be rotated out of the hive every five years. During warm weather in the southeast, *Varroa* mite levels should be checked monthly with appropriate action taken to reduce mite levels as needed. Small hive beetle levels should be checked when inspecting your hives. Honey stores should be monitored, especially during the last month prior to the nectar flow. Honey supers should be placed on the hive when the nectar flow starts. Every time the colony is examined, you should check for diseases like American Foulbrood, European Foulbrood, and chalkbrood. In addition, look for anything that does not look normal. A colony should be fed in the Fall in preference to heavy feeding in the Spring. BC

[1]http://agdev.anr.udel.edu/maarec/educational-resources/powerpoints/
[2]https://beeinformed.org/
[3]http://scientificbeekeeping.com/

David MacFawn is an Eastern Apiculture Society Master Beekeeper and a North Carolina Master Craftsman beekeeper living in the Columbia, South Carolina, area. He is the author of two books, ***https://outskirtspress.com/***

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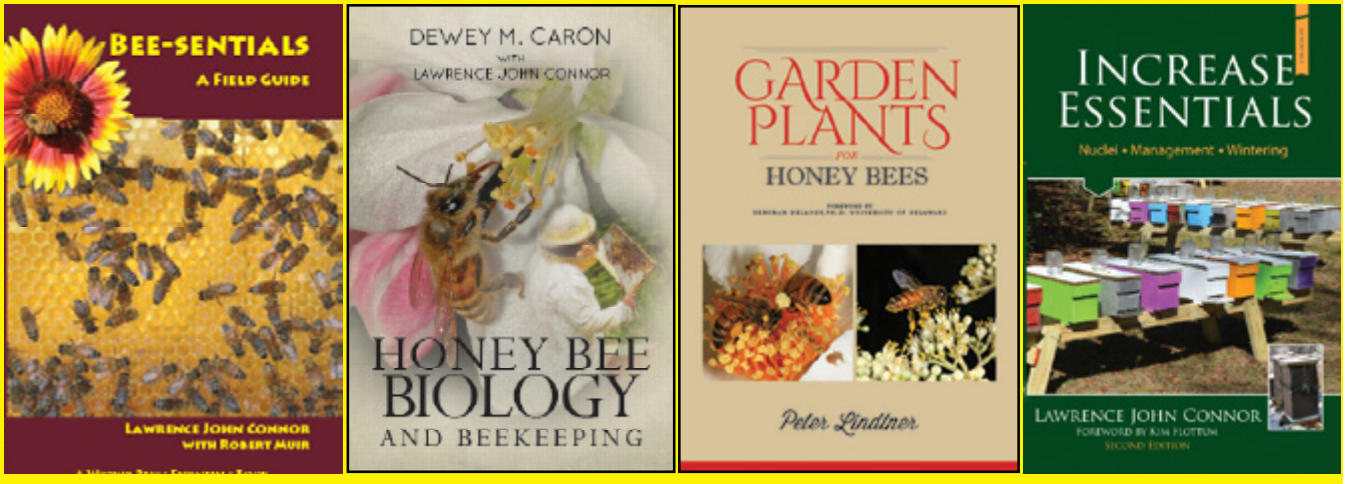

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Answers on Page 87

Bee Towns . . . And More

Jim **Thompson**

Bee, Nebraska was laid out in 1887 when the Chicago and North Western Railroad came to that area. The name was obtained from its location in "B" township. You may have never heard of Bee as it is part of the Lincoln, Nebraska Metropolitan Statistical Area. The population of Bee was 207 in the 1910 census, 191 by the 2020 census and currently estimated at 184. So over the years it has been around the 200 residence mark.

Bee was also the ending point of a cycling race called A to B with "A" being a village named "Å", in Nordland, Norway. The race was in 2004, when Paul Perry rode his bicycle from point A to point B, B happened to be Lou and Mary Anne's Bar in Bee, Nebraska. The 5,600 mile ride started on May 7th and Paul arrived August 28th in Bee. He rode a stationary bike and ran marathons while he was on board the Queen Mary 2 and rode a tandem bike the rest of the time so he could have hitchhikers for company.

There are 16 villages with one letter names in the world and ironically eight of them are in Norway and six are in Sweden. The first "Å" is a village in Andøy municipality, Nordland, Norway. The second "Å" is a village in Moskenes municipality, Nordland, Norway. This was the one used in the A to B bicycle race and in the languages of Danish, Norwegian, and Swedish the word "Å" means brook or small river. This Å is located on the southern end of the island of Moskenesøya. The third "Å" is a village in Meldal Municipality, Sør-Trøndelag, Norway. The fourth "Å" is a village in Åfjord municipality, Sør-Trøndelag, Norway. The fifth "Å" is a village in Ibestad municipality, Troms, Norway. The sixth "Å" is a village in Lavangen municipality, Troms, Norway. The seventh "Å" is a village in Tranøy municipality, Troms, Norway. The eighth "Å" is a village in Gloppen municipality, Vestland, Norway. The ninth "A" is a village in Norrköping municipality, Östergötland, Sweden. The 10th "Å" is a village in Örnsköldsvik municipality, Västernorrland, Sweden. The 11th "Å" is in Kramfors municipality, Västernorrland, Sweden. The 12th "Å" is a village in Söderhamn municipality, Gävieborg, Sweden. The 13th "Å" is a village in Uddevalla municipality, Västra Götaland, Sweden. The 14th, "Ì" is a town in Fujian Province, China. The 15th "A", is a former village in Kami-Amakusa city, Kumamoto, Japan. Sixteenth is an "Ö" village in Sweden.

Currently there are seven businesses in Bee, Nebraska which are: 1. Green Magazine a publisher of periodicals. 2. Jamison & Sons' Lawn Care which also offers landscaping and lawn supplies. 3. Lavicky Tree Removal and Trimming which also offers landscaping services. 4. Lou and Mary Anne's Bar which has bars, taverns, and cocktail lounges. 5. United Farmers Cooperative which provides Agricultural Services, Animal Services, and Services to Farm Organizations. 6. United States Postal Service offering all the services of a Post Office. 7. The Village Bee Offices.

Small Knife w/bottle opener
Bee Co-op, Bee Nebraska

Fred G. Vondra 25 cent Token
Bee, Nebraska

Over the years, there were other businesses and ventures in Bee. In the 1940s, Fred George Vondra had a business called Fred's Place and it was on Second Street. Part of his advertising, he offered two tokens for general merchandise, a 10 cent and 25 cent token.

In 1988, the city of Bee celebrated their centennial.

There were/are seven more towns, ghost towns, and places in the United States with the word bee in their name such as:

Beebeetown, Iowa

The name actually came from the Beebee family, who settled the area in the 1840s. The name is also spelled Biebe, Beebe, and Beeby. The Beebee family came from the town of Beeby in Leicestershire, England. Beeby means "bee town" and a translation or making a town name would be Beetowntown. However another story is written that the original town name was: "Originalredrydercarbineaction-twohundredshotrangemodelairifle" and the Post Office wanted to make it shorter. Since it was a bee bee gun and/or the first postmaster was Frederick F. Beebee, it was named Beebeetown. I find that Red Ryder story hard to believe as the Post Office opened November 26, 1879 and was discontinued July 14, 1905. Both of these dates were well before 1938. Secondly, the Red Ryder bee bee gun was first sold in 1938 and had a 650 shot capacity.

The population of Beebeetown is also confusing as one source mentions the 2010 census was listed as 842 and another source mentions that current population is estimated to be 598. While another source says no information was included in the

past census. I have noticed pictures of buildings such as the school, Uncle Mikes, and the Post Office being abandoned. In one picture it shows the demolition of the High School.

The Twisted Tail Steak House and Saloon owned by Ed and Ruth Spencer evidently started in Beebeetown but now has a Logan, Iowa address which is eight miles away. The Twisted Tail has been voted as having the best burger in the State of Iowa.

The location of the town of Beebeetown was straight west of Des Moines, almost to the Nebraska State line and I believe that there is nothing left there except a Beebeetown sign.

Bee Cave, Texas

Bee Cave, Texas is in Travis County about 12 miles west of Austin, Texas. The name was derived from the colonies of Mexican honey bees that lived on the banks of Barton Creek. It was a village that became a city when the city's area increased to 6.8 square miles of all land. Currently the city is listed as having 8.57 square miles. According to the 2010 census there are 3,925 people in the city and estimated 6,801 people today.

Another story about the city naming was a bee cave of wild bees was found by Dietrich Bohls in 1850. A post office opened there in 1870 with Martin V. Lackey as postmaster and the name of the city was Bee Caves. In 1871, Will Johnson started a trading post and by the mid 1880s there was a steam grist mill, a cotton gin, a general store, a church, a school, and 20 residents. However the population fell to only 10 people in 1890, but regained residents so by 1914, they could brag that there were 54 people. The post office was discontinued in 1915 and the population stayed around the 50 mark through the 1980s. Mail for the people in Bee Cave was carried by the Cedar Valley Post Office; however that Post Office was discontinued in 1957. Current Post Office for the residents of Bee Cave is in Lakeway Texas which is nine miles away. The city was incorporated in 1987 and the name was changed to Bee Cave and it has been growing ever since.

Bee Lick, Kentucky

There was once a community in Pulaski County named Bee Lick, Kentucky. In 1895 there were 38 people residing in Bee Lick. They had a Post Office but it closed in 1910. The only landmark for Bee Lick is Thompson Cemetery which has 26 graves.

The early settlers would put a block of salt out usually near a water source to attract animals such as buffalo, deer, and elk. It is supposed that they noticed bees near the salt blocks and thus named their community. In Kentucky there are towns named Mud Lick, Deer Lick, Paint Lick, Sulphur Lick, and Wolf Lick.

Beehive, Montana

The town was named for the Beehive Rock that is north of town. Beehive seemed to develop in 1910 when it acquired a Post Office. Later the town had a hotel and a grocery store. In 1938 a dude ranch called the Lazy B Ranch owned by Bill Parkhill was incorporated. In 1953 the Post Office was closed and the mail is handled by the Absarokee Postal area 59001. The population according to the 2010 census is 32.

It is still considered a getaway destination and has several seasonal homes.

Beetown, Wisconsin

In 1827 a mining settlement in the west part of Grant County; Cyrus Alexander, Thomas Crocker, James Meredith and Curtis Caldwell pitched their camp at the base of a large tree. During the night, a storm blew over the tree. The men noticed a cavity in the tree containing bees and honey. Tangled in the roots of the tree were boulders of lead ore. Thus they called their mining camp "Bee Lead" which was the origin of Beetown. In 1845 the village became prosperous due to more settlers moving in. In 1848, the village was surveyed and laid out. In 1850 the discovery of gold in California drew many of the people from Beetown, there were only about a dozen people left. In 1851, there was a great flood that swept through the valley. At one time there were 1,740 inhabitants in Beetown, however by the 2000 census there were 734.

Beeville, Texas

Beeville, Texas was settled in 1830 by the Burke, Carroll, and Hefferman families, although the original name was Maryville. 150 acres of land were donated by Ann Burke in May 1859 and named the town for pioneer Mary Hefferman. It was renamed "Beeville-on-the-Poesta" after Barnard E. Bee, Sr., who served as Secretary of State and Secretary of War for the Republic of Texas. A community seven miles to the west was named "Beeville-on-the-Medio". Beeville-on-the-Poesta won out as it was on the Poesta River and became Beeville. In 1886, the Southern Pacific Transportation Company operated the railroads until the early 1970s. Beeville was incorporated in 1890 but the incorporation was dissolved in 1891. Then it was incorporated again in 1908.

Beeville is the county seat for Bee County, Texas which is listed as having 12,863 residents by the 2010 census. Besides having several businesses, Beeville has the main campus of Coastal Bend College and an area around the city contains


Bee County Courthouse - Beeville, Texas

Bee Packing Company
Beeville, Texas
1936 - Tom Turkey

three prisons operated by the Texas Department of Criminal Justice.

Bee Packing Company which processes turkeys issued a token for a tom turkey in 1936.

Beeville operated the Beeville Naval Air Station from 1943 to 1946 to train Navy airplane pilots and then reopened the base in 1952. It was known as Chase Field and was in operation until 1992.

Bumble Bee, Arizona

Bumble Bee, Arizona was established in 1863 and served as a stagecoach stop and an outpost for the U.S. Cavalry. A post office was established in 1879. The town was named because the indigenous people there were as "thick as bumblebees". The town was situated in the middle of the state of Arizona. The reason that it became a ghost town is that the demise of the stagecoach and mining in the surrounding area faded. An attempt to turn the town into a tourist attraction by Jeff Martin in 1930 failed. Another attempt was made in 1960 by Charles A. Penn and he was planning on adding a museum, but he died before his plans came to fruition. Since then many of the historic buildings have been torn down and smaller homes have been built in their place.

Lake Chargoggagoggmanchanggagoggchaubunagungamaugg

In researching the Bee towns, I came across a sign for a lake outside of Webster, Massachusetts. One of the Lake's name is 45 letters long and I was thinking that it would be quite a surprise to read the sign when you are traveling by at 55 miles per hour. Oh well, I'll make it easier for you, there are only 14 syllables. Doesn't that help? The name is Lake Chargoggagoggmanchanggagoggchaubunagungamaugg. It used to be 18 letters long but in 1921 it was lengthened.

The Nipmuch language means "Fishing Place at the Boundaries - Neutral Meeting Grounds" or "lake divided by islands". However the translation that is easiest to remember is "You fish on your side, I'll fish on my side, and no one shall fish in the middle." Local people refer to it as Webster's Lake, but it is the lake with the most lettered name in the United States. The lake has seven or eight islands, some of them are habitable.

Second longest name for a place in the world

Llanfairpwllgwyngyllgogerychwymdrobwllllantysiliogogogoch was created in the mid 1800s for a railroad station so it would have the longest sign in the country. However it is now the name for the village that has 2,999 people according to a 2018 estimate. It is located on the Isle of Anglesey, Wales, in the United Kingdom and has 58 letters. Translated from the Welsh language, it means "Saint Mary's Church in a hollow of white hazel trees near the rapid whirlpool of the church of Saint Tysilio with a red cave".

I was reading someplace that the words on a map are limited to 52 letters and so you won't see this version on any map. There are a couple of shorter versions of the word.

Are you ready for this? The longest named hill in the world.

Taumatawhakatangihanga-koauauotamateaturipukakapikimaungahoronukupokaiwhenuakitanatahu is 85 letters in length. You may find it on North Island, Porangahau, New Zealand in the language of Māori which means: "The summit where Tamatea, the man with the big knees, the climber of mountains, the land-swallower who travelled about, played his nose flute to his loved one." If you have trouble with this word there is another version with 105 letters for the 1000 foot hill.

I hope you enjoyed your journey from A (a single letter town) to Taumatawhakatangihanga-koauauotamateaturipukakapikimaungahoronukupokaiwhenuakitanatahu (the longest lettered hill in the world). I figured that you wouldn't like to see the longest word in the world as it has 189,819 letters and takes 3.5 hours to pronounce. It is a Titan Protein and is a combination of mashed up components.

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THE SEEANDBEE

The *SEEANDBEE* was once the largest and most costly inland side wheeled steamer on the Great Lakes with four smoke stacks (funnels). It was launched November 9, 1912 and began its career June 19 1913. It was 500 feet long, weighed 6,381 tons, and could hold 1,500 passengers. It was built by Detroit Shipbuilding Company of Wyandotte, Michigan for the Cleveland and Buffalo Transit Company. The Cleveland and Buffalo Transit Company (C & B) was established by Morris A. Bradley in 1885 and incorporated in 1892. It was a steamship and trucking firm that had regular trips from Cleveland's 9th Street pier to Buffalo, New York and sometimes it would stop in places like Toledo, Cedar Point, Put-in-Bay, and make runs to Detroit and Chicago.

A contest was held to give the ship her name. The winning name came from the words for the C & B line, *Seeandbee,* but occasionally you may see *Sea and Bee*.

Due to the growing automobile travel along the Cleveland to Buffalo

route, the C & B shipping business fell on hard times. In 1938 the C & B line operated at a loss of $192,162. On May 27, 1939 a special meeting of the shareholders voted to liquidate the company. The *Seeandbee* was sold for $135,000 to C & B of Illinois which was an independent firm. They had been formed earlier that month in order to charter and operate the *Seeandbee* under lease. However they ended up purchasing the ship instead. They operated the *Seeandbee* on a regular schedule through 1941. The rest of the line consisted of *City of Erie*, *Goodtime*, and the hull of the *City of Buffalo* (which had been gutted by fire) were all put up for sale.

In March 1941 Thomas J. McGuire bought the *Seeandbee*, anticipating an increase of Great Lakes travel, but that ownership was short lived.

The bombing of Pearl Harbor, Hawaii found the United States in great need of aircraft carriers and training ships. The specifications were that ships needed to be 500 feet long and travel at least 18 knots per hour.

March 2, 1942 the *Seeandbee* was acquired by the navy at a cost of $756,500 and converted into a training aircraft carrier, USS Wolverine. It is estimated that from May 1942 to August 1942, 550 feet of wooden flight deck was installed, a new bridge island built, arresting cables installed, the funnels were rerouted, 45 miles of welding done and 57,000 bolts, washers and grommets were used during the refit operations. She was commissioned on August 2, 1942 and made her first trial run as an aircraft carrier August 9, 1942 at Buffalo, New York. The *Wolverine's* homeport was the 9th Naval District Carrier Qualification Training Unit, Chicago Illinois. The *Wolverine* was not a true carrier as it lacked elevators for aircraft, storage for aircraft, armor, and armaments so some called it a "freshwater flattop".

SS Greater Buffalo - before conversion

The Seeandbee specifications as the *Wolverine* were: Displacement 7,200 long tons, Length 500 feet, Beam 58 feet, Draft 15.5 feet, 5 Decks, Power 12,000 HP, and Speed 22 miles per hour or 19.1 knots/hr.

Following the war, the *Wolverine* was decommissioned November 7, 1945 and sold for scrap December 1947 and dismantled at Milwaukee.

A second cruise ship, the *Greater Buffalo* owned by the Detroit & Cleveland Navigation Company was requisitioned May 1943 by the US Navy to be turned into an aircraft training carrier, the *USS Sable*.

The *Greater Buffalo* was referred to as being the sister ship to the Seeandbee, but that distinction goes to being the only freshwater, coal-fired, side paddle-wheeled aircraft carriers in the United States Navy.

The *Greater Buffalo* was built by the American Ship Building Company, Lorain, Ohio in 1924 for the Detroit and Cleveland Navigation Company in Detroit, Michigan. It cost $3,500,000.00 and was launched October 27, 1924.

The *Greater Buffalo's* interior was designed by W & J Sloane & Company of New York City with an adaptation of the Renaissance style and sometimes nicknamed "Majestic of the Great Lakes". The ship's saloon was on two decks. There were 625 staterooms and more than 1,500 berths for passengers. It featured a 22-foot mural, a promenade deck at the stern, a smoking room that was lined with windows, telephones in each room, a dining room that would seat 375, washed and cooled air which was the answer for air conditioning, and foot lights in the hallways. There was the availability to haul up to 103 vehicles on her main deck and space for 1,000 tons of freight.

The specifications of the *Greater Buffalo* were: Length 518.7 feet, beam 58 feet, height 21.3 feet, weight 7,739 gross register tons, nine boilers, Speed 18 knots, and a three-cylinder inclined compound steam engine rated at 10,500 horsepower. After the conversion the flight deck was 535'-5" long.

There were seven decks, three smoke stacks or funnels, and rudders at both ends for improved maneuverability. She carried a crew of 275 stationed on the lowest deck fore and aft of the ship's machinery.

The ships in the Detroit and Cleveland Navigation Company were: *Greater Buffalo* (1923-1947), *Great Lakes*, *Greater Detroit* (1923-1957), *City of Cleveland III* (1907-1956), *City of Detroit III* (1912-1957), *City of Makinac* (1883-1982), *City of Alpena*, *City of St. Ignace*, *State of New York*, *Western States* (1902-1959), and *Eastern States* (1901-1957). The normal route was from Buffalo, New York to Detroit, Michigan with an evening of dinner, dancing to an orchestra, and radio programming in the main saloon.

During the Great Depression, the *Greater Buffalo* and *Greater Detroit* were taken out of service from 1930 to 1935. In 1936 the *Greater Buffalo* was docked at Cleveland and used as a "floating hotel".

August 7, 1942 the *Greater Buffalo* was acquired by the Navy to be converted into a training aircraft carrier named *USS Sable*. The conversion was done at the Erie Plant of American Shipbuilding Company at Buffalo, New York. A steel flight deck was installed which allowed a variety of non-skid coatings

USS Wolverine - August 22, 1942

The 22 foot Mural

USS *Sable* (IX-81) on Lake Michigan

to be tested, eight sets of arresting cables were installed, a bridge island constructed and outriggers installed forward of the island for damaged aircraft. Down below there was a sick bay, operating room, laundry, tailor shop, crew quarters, cafeteria, mess hall, and storerooms.

Many of the *USS Sable* crew were survivors of *USS Lexington* which had been lost in the Battle of the Coral Sea. The *USS Sable* was commissioned May 22, 1943 with Captain Warren K. Berner in command. She was docked beside the *USS Wolverine* in Chicago, Illinois May 26, 1943 and sometimes when the two Navy ships were together, they were called the "Corn Belt Fleet".

An issue arose due to the lower speed of the *USS Sable*, there wasn't enough wind over the deck to launch aircraft on calm days. So after August 1943, Sable was used as a base for testing the experimental TDN-1 torpedo drone aircraft.

On Sable's first day of training pilots, 59 pilots were qualified within nine hours of operations, with each pilot making eight takeoffs and landings. Pilot training was conducted seven days a week in all types of weather conditions. Between the years of 1942 and 1945 for both ships, 17,820 pilots were trained in Lake Michigan among them was President George H. W. Bush, who was trained on the *USS Sable*.

The *USS Sable* was decommissioned on November 7, 1945 and struck from the Naval Vessel Register on November 28, 1945. She was sold to H.H. Buncher Company on July 7 1948, but before going through the Welland Canal, she had to have 28 feet of her beam and 50 feet of her stern removed. Even then there was only five feet of clearance on each side of the ship while going through the canal locks.

By the end of the war, revenues fell again and the accident of the *City of Cleveland III*, finished the company. The D & C Navigation Company was formally dissolved May 9, 1951 and shortly their after old harbor terminals were condemned by the city of Detroit. By 1959, most of the line's remaining ships had been scrapped. BC

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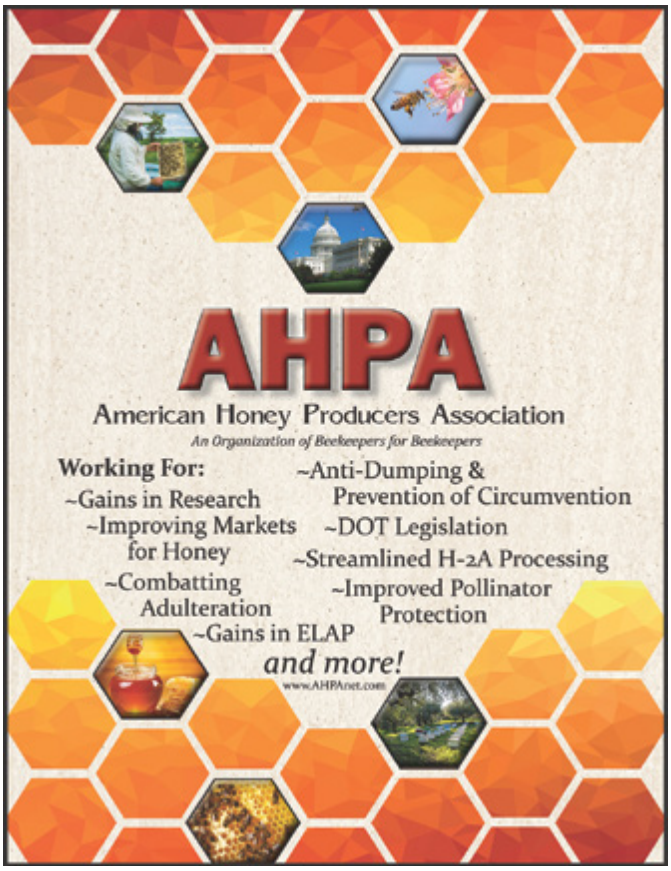
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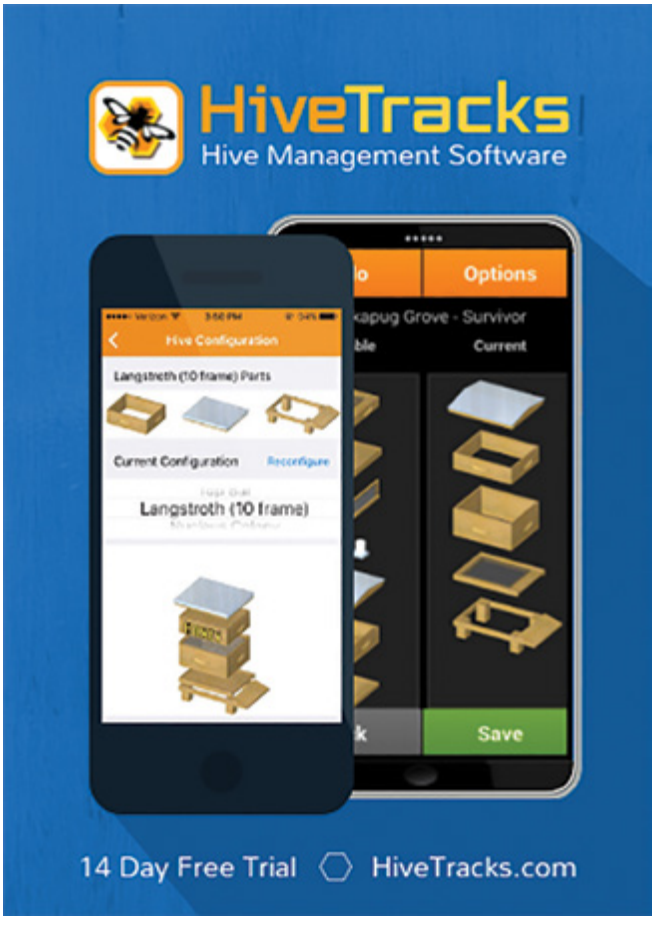
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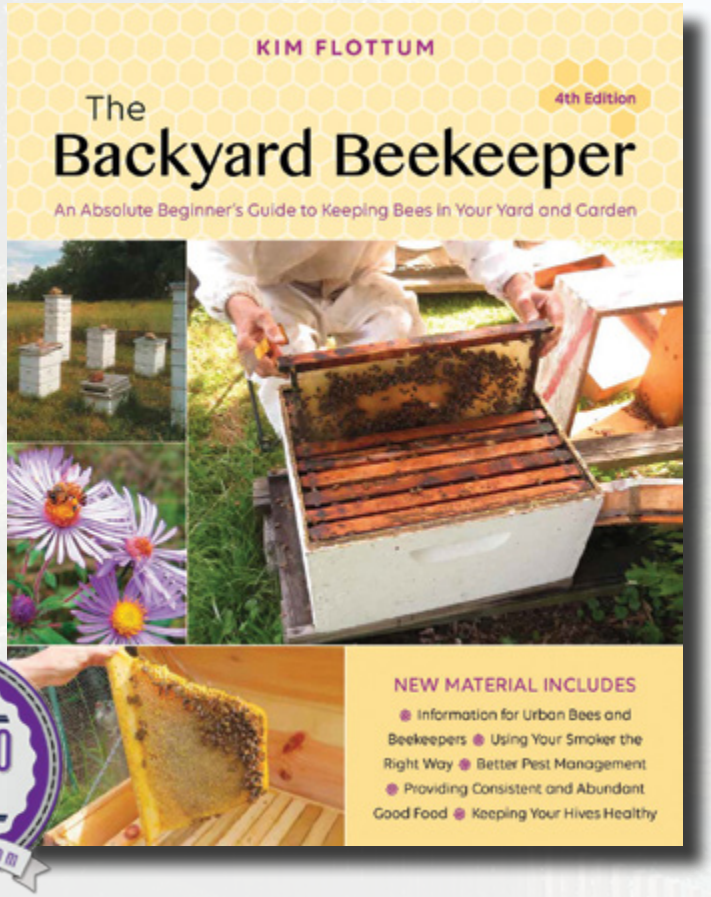

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BEE NAVIGATION

Sensory Structures Of The Honey Bee

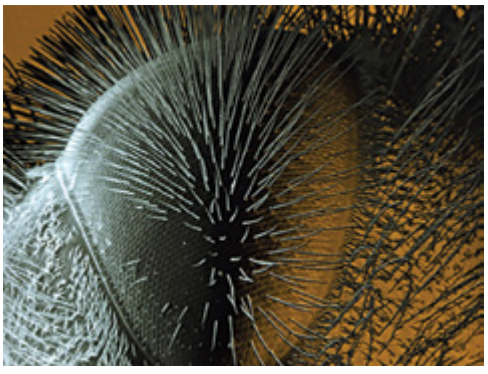
Abbas **Edun**

Besides their importance in agriculture, and their production of honey, pollen and propolis, honey bees serve as a model organism for studying our health issues – including, inter alia, antibiotic resistance and longevity. It is therefore fitting for the author to put into perspective for the reader, the manner in which they perform their functions.

Animal navigation is a mysterious, natural phenomenon that has attracted the attention of both scientist and layman alike for a very long time. Navigation may be defined as the art, science, or act of accurately determining and maintaining a course or trajectory from one place to another. [1] The life of the honey bee depends upon accurate navigation because she is driven by an unexplained tendency to locate nectar, pollen, resin, and water in an unpredictable, complex
and constantly changing three-dimensional world.

Moving rapidly through the air[2], the worker requires a continuous flow of sensory information to navigate the landscape, sense environmental changes, locate the presence of obstacles in her path, and respond to the color, shape, and odor of flowers. Like many other animals, she is able to find her way accurately without maps or instruments. The forager navigates by using a variety of information gathered by a complex combination of visual, olfactory, and magnetic senses[3].

Of these sensors, vision is one that is well suited for navigating. Bees use a well-developed visual system to stabilize their flight, avoid collisions, and execute a smooth landing[4]. They have two types of eyes, simple[5] and compound. The former are known as ocelli, and there are three of them. Two are near the back of the head and the third is just forward of those two. These eyes are used for orientation: bees triangulate on the position of the sun and use the information to guide them to and from their homes.



The two compound eyes are complex organs capable of a wide range of photoreceptive functions, and allow the bee to see in almost every direction simultaneously. They are made up of many individual units called ommatidia, each effectively functioning as a separate single eye. Every one consists of a lens, light-sensitive visual cells, a transparent crystalline cone, and pigment cells that help to prevent light from straying between adjacent neighbors. The image perceived in the bee's brain may be a combination of the information which enters the ommatidia. We may think of it as a mosaic made up of many tiny visual units, or even like the pixels on a screen, but how the bee itself perceives the image is difficult to determine. The main shape of the compound eye is based on a convex surface, so that the ommatidia form a dome and point in slightly different directions.

Behind each facet of their compound eyes, bees have photoreceptors for ultraviolet (UV), green, and blue wavelengths that are excited by sunlight reflected from the surrounding panorama. However, they cannot see the color red because they do not have a photoreceptor for it. We have trichromatic color vision[6]. There are three photoreceptors in the retina of our eyes. One is sensitive to blue, another to green, and a third to red.

Seeing objects through a bee's eye is the dream of many researchers. Her remarkable eyesight has long been a source of fascination to the scientific community. Early in the twentieth century Karl von Frisch (KVF) did a simple and elegant demonstration, the procedure of which is described in his 1956 book[7]. The 1973 Nobel Prize in Physiology or Medicine was awarded jointly to him, Konrad Lorenz and Nikolaas Tinbergen for their discoveries concerning the organization and elicitation of individual and social behaviour patterns.

Adrian Horridge is a distinguished Professor Emeritus of the Australian National University. He started to do substantial work on all aspects of insect vision in 1961. In contradicting the 100-year-old undisputed theory of bee vision, he said that von Frisch knew nothing about the types of receptors in the apian eye. Being unaware of the mechanisms of color vision, he assumed that ours is similar to that of the bees, and he designed experiments that tried to prove it.

Unfortunately for him, bee vision is not the same as ours[8].

Professor Horridge said: "Bees locate and measure amounts of blue in areas and, separately, quantities of green contrast at edges, and the angle between. They do not identify colors except by these features. To bees, white is an intense blue and black is zero blue with maximum edge contrast. Experimental science proceeds by demonstrating that old errors require revision, and by providing a new explanation that others should verify and build upon."

Professor Adrian's recent book is the only account of what honey bees actually see. They detect some visual features such as edges and colors, but do not reconstruct patterns or put together features to form objects. Bees detect motion but are not able to perceive what it is that moves. They do not recognize "things" by their shapes, but they clearly see well enough to fly and find food with a very minute brain. The conclusion is that bee vision is adapted to the recognition of places, not things[9]. The flowers of some plants which are pollinated by bees have dark patterns of blue, yellow,

and UV that evoke a strong response in their eyes. The patterns, near the centre of the flower, are called nectar guides, and orient the bee to the new explanation that others should verify and build upon."

The flowers of some plants which are pollinated by bees have dark patterns of blue, yellow, and UV that evoke a strong response in their eyes. The patterns, near the centre of the flower, are called nectar guides, and orient the bee to the proper pollinating location. They are not visible to us because we do not have the ability to see UV light.

Some animals, including honey bees, depend primarily upon celestial cues such as a sun compass for spatial orientation and long-range navigation[10]. Because it moves in the sky, navigation by the sun requires an internal clock. Many animals depend on such a clock to maintain their circadian rhythm[11].

The sun is the primary compass of our bees, but there are times when it is not visible, e.g., under overcast skies. In such cases, they use a mechanism based on their ability to sense the pattern of linearly polarized light in the sky[12]. A structure in their eyes that is sensitive to such light [13] enables them to estimate the position of the sun, relative to the direction in which they intend to travel[14].

The Earth's magnetic field is analogous to a large magnet with its poles localized near to the geographical ones[15]. It provides a globally pervasive and relatively stable frame of reference that animals can exploit for short- or long-distance orientation and navigation across the world[16]. Magnetoreception is a sense which allows an organism to detect this field. This sensory modality is used by a range of organisms to construct detailed internal maps of local variations and features, which are then used to ascertain the animal's direction, altitude and location[17].

The role of the earth's magnetic field for orientation and navigation has been confirmed in bees[18]. They have bits of magnetite[19], a ferromagnetic oxide of iron that is also found in some types of rock; its chemical formula is Fe_3O_4. It is located in two places in her body: a region in the front of the abdomen, and bands of cells around each abdominal segment[20]. Clarence Collison has recently written a very interesting and detailed article about this magnetic sensitivity of bees[21].

Researchers from Bristol University in the UK recently discovered that bees are actually able to sense a weak electrostatic field emanating from flowers[22]. It helps with pollination by causing pollen to be drawn toward the body hairs of positively charged bees from negatively charged flowers.

Olfaction is a molecular sense in which information carried by atmospheric chemicals is transformed into patterns of brain activity that form the basis of odor perception. It is a very important sense for the survival of a lot of animal species including insects[23].

The honey bee genome, sequenced in March 2006, shows that there are 170 odorant receptors in *Apis mellifera*, compared with 62 in fruit flies, and 79 in mosquitoes. The large number of receptors is responsible for the honey bee's exceptional olfactory ability; it is estimated to be a lot better than our own. Examples of the honey bee's olfaction-dependent behavior are the location of resources, avoidance of predators, and communication both inside and outside of the nest[24]. Floral scent is an

important cue that insect pollinators learn to associate with nectar because of the dominant role that odors play in the lives of insects[25].

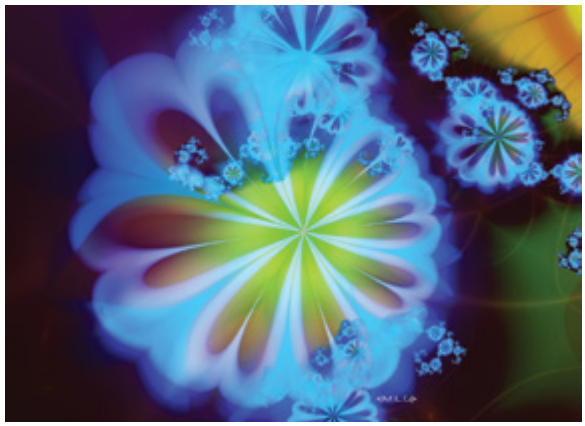
The ability of animals to explore landmarks in their environment plays a key role in navigation. Foraging worker bees choose landmarks based upon their relative uniqueness, conspicuousness, stability, and context[26].

Sound is a mechanical disturbance that is typically transmitted as an audible, longitudinal wave of pressure, through a material medium – most often air[27]. It is the impression received by the brain when it interprets vibrations within the ear structure caused by rapid fluctuations in air pressure.

Vibration causes molecules in the medium to pulse outward, colliding with nearby molecules, creating waves. Vibrations and sounds, together called vibroacoustics, play a significant role in the lives of a lot of insects, including social bees[28]. Insects can produce sounds and vibrations in five principal ways using a variety of structures in their body. These are (i) stridulation (rubbing two body parts together); (ii) percussion (striking body parts such as feet, head, or abdomen on resonant substrates); (iii) tremulation (vibrating some body parts in the air); (iv) vibrating specific membranes called tymbals; and (v) forcibly ejecting air or fluid[29]. We hear sounds by detecting the resulting oscillations in pressure; bees can sense airborne sound by detecting air-particle movements[30].

Vibroacoustic signals are perceived mainly by the Johnston's organs (JO), and by subgenual organs in the legs. The JO consist of over 300 nerve cells (scolopidia), in the second segment (pedicel) of the antennae. Air-particle oscillations cause the long, thin flagella to vibrate[31], and the JO convert mechanical vibrations into nerve impulses relayed to the brain. This sensory system is sensitive to air vibrations up to about 500 Hertz, and is well suited to detect the 200-300 Hertz sounds produced by dancing bees. [32] There are a couple of recent articles in the bee magazines which deal with the perception of sound by honey bees[33]. They are very well written and are worth reading.

Taste is very important to honey bees because they use it to choose profitable food sources and to recognize nestmates. The chaetic and basiconic sensilla[34] have gustatory receptor cells and play a role in taste detection. Gustatory sensilla are located mainly on the flagella, the mouthparts, and the tarsi of the forelegs. The sensilla respond with varying degrees of sensitivity to sugars, salts, and possibly amino acids, proteins, and water[35].



The composite organization of the honey bee colony consists of three adult castes[36] and brood. The colony provides for many coordinated activities and developmental processes and therefore needs an elaborate manner of communication among its members. Pheromones (PHS) are a key factor in generating and maintaining complexity, assuring a broad plasticity of functions that allow the colony to deal with changing environmental conditions and unforeseen events[37]. PHS are chemical substances exuded by the exocrine glands of some animals; they elicit behavioral or physiological responses by others of the same species[38]. PHS are involved in almost every aspect of colony life: development and reproduction (including queen mating and swarming), orientation, foraging and defense. They allow communication among all three of the honey bee castes, and between adult bees and brood[39]. Queen mandibular pheromone is one of the most important pheromones in the hive. It inhibits queen rearing as well as ovarian development in workers. It is also a strong sexual attractant for drones when a virgin is on her nuptial flight, and it is critical to worker recognition of the presence of a queen in the hive[40].

Foragers function not only as gatherers of food, but also as sensory units shaped by natural selection to gather information regarding the location and profitability of forage sites. They transmit this information to their sisters by means of a series of complex movements known as dances[41].

The author is very fortunate to have been associated with these amazing creatures because of their impressive sensory abilities. He first became interested in the superpowers of bees many years ago. BC

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A	I	R	O	O	T	A	N	A	J	N	O	T	N	A	W	R	C	K	J
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Bee Management Anxiety

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A cold, steady rain is coming down

It's May 9th in Northeast Ohio. Maple blooms – long gone. This season's fruit bloom has come and gone. My bees are currently in a dearth. They are awaiting the next phase of the annual nectar/pollen flow that will come in a few days from sources like tulip poplar and clover. If the weather breaks, my bees will try to stay busy with some residual meager blooms and maybe rob their neighbors' resources a bit. Until then, if you're a bee forager, there's not much to be done just now. Stand by.

At this very moment, a cold rain is falling. It's cold enough that frozen slush is accumulating on my truck windshield above the windshield wipers. I have packages and queens partially installed. The bees are out, but I still have the queens confined. I'm worried. It's that worrying time of the year. Erratic Spring weather is typically worrying weather.

Worrying is a component of beekeeping

Oh, so often, beekeepers are sold a bill-of-goods in beekeeping. Practicing the craft is *"relaxing"* and *"rewarding"*. We are told that it's *fulfilling*. I should envision blue skies, gentle bees – with absolutely no inclination to swarm – flying contentedly to rewarding floral sources from which they will gather nectar to make delectable honey crops. In carefree fashion, I will extract this crop – without regard to messiness and stickiness – and bottle it in attractive containers. Without even more regard to income, expense, or labor, I will then give my honey to deserving individuals, who will say, *"Oh…you're a beekeeper!?"* I will humbly drop my head and reply, "*Yes, I am a beekeeping practitioner of this noble craft."* Nowhere in my idyllic story did I mention expensive bee packages with confined queens on minimal honey stores in bee boxes that are sitting out in freezing rain.

My beekeeping appreciation is not diminished

I am not complaining about beekeeping. All those years ago, if I was sold a bill-of-goods, it was because I wanted to make the purchase. In oh-so-many ways, worrying puts a value on the decisions I make in my beekeeping enterprise. If this was an easy process – if we won every time – everyone would be beekeepers. So, when I do something right, it makes the decision-making event sweet and rewarding. But writing that statement does not mean that I am not concerned about the future of these packages that are back there right now – in freezing rain. I'm worried about them. Absolutely.

My worry last year

I hope you don't recall this memory, but exactly this time last season, I was worrying about my packages – just exactly as I am now. At that time, I wrote about it. But last season my worry was whether or not I could/should feed old honey from my Winter dead-outs back to my packages. I had a goodly amount of sullied honey that I did not feel was fit for my consumption, but I wondered if the bees might want it. Yes, they did. I wrote about the success of those packages building up on that old, dark honey.

The packages grew into behemoth colonies. They became too tall. They were difficult to treat for mites. I never saw the queen, but thankfully I had little reason to search for her. The hives were crazy heavy. When I worked them, bees matted and festooned everywhere. Heavy smoke was always required. They were not enjoyable to work. I stopped worrying about old honey and shifted to worrying about managing large colonies. I worried about swarms departing from these mutants. I worried that these big bee boxes would disconcert my neighbors. I worried. I worried, but honestly, what beautiful challenges those beehives were.

Last Winter came and went. It was nothing exceptional, but it was a typical Winter dearth. My beautiful colonies experienced the typical Winter colony die-off. I worried and I wondered if I would have any survivors. From my perspective, in my apiary, at this time in my life, I could not say that these oversized colonies succeeded any better than a typical two-deep colony. I am not suggesting anything about your situation. Could I write that sometimes big colonies can lead to big disappointments?

My personal take from that experience

My personal take from that experience, and my take alone, was that (1) yes, within reason, I could feed ugly, old honey, in combs, to package bees. The bees did a beautiful job of refurbishing that honey and making new bees from it.

I was judicious. I only put three of four frames of needy honey in the hive at one time. I tried not to overwhelm the three-pounds of bees doing the restoration work.

My second observation (2), for me, was that huge colonies (3 deeps and two or three supers) did not fare any better that typical colonies. I'm not going to do that huge colony thing this season. I would rather have a few smaller colonies that I can manage more efficiently.

At this point, it is important for me to say that I am not the youthful beekeeper I once was. Smaller, more manageable colonies fit me better now. Years ago, I would have been much more in love with these larger units – but that's just me.

A dead package queen

Last season, one of my package queens was dead in the cage. The fairness of whether or not to replace such a queen is the stuff of another article topic. In my case, due to the distance to the provider and the policy of the provider, she would not be replaced. That may or may not be fair, but again we can discuss this some other time.

The fact was that I had to deal with a queenless package. I simply combined the queenless package with a queenright package. As you would expect that double-package colony exploded. Later in the season, when I could get a queen, I divided the big colony into halves, and all ended (mostly) happily.

Now, too many queens

Please hang in there – I'm going somewhere with this queen thread.

This year, with the memory of last year still fresh, I picked up two extra queens. *"I can always use them,"* I said to myself. When I said that to myself, I had that idyllic view in mind that I discussed above. I did not picture long periods of rain and late season cold weather. I should have. Something like this happens every season. Now nearly 10 days later, I still have those queens in cages. I'm storing them in one of the package colonies. Of course, I worry about them.

Years ago, when I raised my own queens and they were plentiful and cheap, I kept several queens in cages for nearly six weeks. Occasionally, I changed out the workers and fed fresh sugar candy along with an occasional drop of water. Though I knew the queens would not go forever, when they died, I was bummed. So, I know queens can be caged for long periods, but it can't be good for them. That dead package queen has made me see that – for me – buying extra queens for early season use is not a great idea. If the early Spring weather is uncooperative, extra queens are hard to get into splits.

If I have package queen issues, it seems to work best for me to combine the queenless packages, build that colony up, and then split it a few weeks from now when the season is dependable, and queens are a bit more readily available. What makes this work, for me, as well as it does, is that I still have abundant stores of comb honey that I can use to pump up the colonies. Well, *"not to worry."* One day, when I do not have this extra honey, I can still feed sugar syrup and accomplish the same goal.

It's not just springtime packages

Our bees are not unlike our children. There's always plenty of new things about which we can worry. In a few short weeks, I will probably be worrying about swarms. Or I will be worrying (again) about my neighbors. Or are the colonies ready for Winter. Should I treat for mites again? There is always something.

Swarms

I constantly tell others that we can try to control swarming, but we are going to ultimately fail. Bee swarms are a bee fact of life. That is oh so easy for me to write, but when that swarm is issuing and I am on the scene, am I worried or am I excited or am I both? *Do something, Jim!* I will even consider tanging the swarm (that should alight some of you). In my case, the swarm is most likely going to pitch on a near neighbor's property. *"Here we go again."*

Several years ago, I had to ask my tolerant neighbor to stop his mowing in order for me to see if I could recapture a recalcitrant swarm. They kept going and all I accomplished was disrupting my neighbor's schedule. Having done that, I worry that it will happen again.

Times that I should have worried

Anytime – and I do mean any time – that I have full colonies confined and loaded on a truck, traveling down the road, I worry. Even when things work beautifully, I worry. Many years ago, an outer cover became unattached, flew from

Been caged over a week and now a cold rain. Should I worry?

I can't seem to secure enough. I always worry.

the hive, sailed into the neighboring lane, and struck the grill of a car that was passing me. I had to stop and talk to the discombobulated driver. Standing by the road that day was not a good time for a lecture on the value of insect pollination. If I live for hundreds of years to come, I will not forget that experience. *(Just so you know, all ended well. No damage was done, and the other driver went on his way. However, I seriously doubt that he became a beekeeper.)*

On a late Winter, cold morning, I loaded six colonies of bees on an open trailer and hauled them 50 miles to a state bee meeting. The ambient temperature was below freezing. Upon arrival at the meeting, I discovered that I caused the confined colonies to overheat and suffocate. They were all dead. Egad, it was below freezing. Driving to the meeting that day, my concern was that the outer covers should not blow off. I had no idea that I was worrying about the wrong thing.

At another property, at another time, yet another neighbor came over and saw two colonies I had there. He said, *"Oh, I didn't know you had bees back here."* He and I were standing in the colonies' flight path and I worried that he would be stung. Even as I was having that very thought, a bee needlessly stung him just under his right eye. I can only write that I was aghast. I was right to worry. I should have worried more. I should have responded to my worry. Worrying is not a bad thing.

When is the best time to worry?

I seem to do my best worrying about 11:00 PM. The day is done. I am quieted and I have time to think. *Is the cluster covering those queen cages? Did I leave enough honey frames in those new colonies? Will they swarm tomorrow? Did that last mite treatment work? Did I release the queens too soon? Do I have too many colonies in my home yard?*

But readers, I ask, are you and I truly *worrying* or are we just *reviewing* our management decisions? Like so many other things in life, bee colony management is not an exact procedure. We do our best. We strive to always win more than we lose. Just ask your computer thesaurus for alternatives to "worry". Stunning number of choices. Is "worry" always the best term for what we are feeling? Maybe we are just second guessing.

It's okay

Go ahead. Worry about your bees. Second guess your decisions. It's how we grow in our craft. It's how we help others grow. Fretting helps us stay on the management path when the way is unclear.

Thank you

If you wrote me and I did not respond, please know that I am sorry and I truly appreciate you taking time to write. It was not because I did not care. If you subscribed to my YouTube channel and I did not tell you I appreciated your decision, I apologize. I meant to, but I just did not get to it. If we are friends on Facebook and I have not responded to your message, it was never a personal affront. If you have listened to some of Kim Flottum and my podcasts, I thank you for that. We need listeners. If you read this article, I especially thank you. I appreciate the privilege of being able to work beyond my retirement. Without an audience, I have no reason. Thank you. BC

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

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M. floribunda – *Pink Princess*

The A.I. Root Pollinator Garden

Alyssum **Flowers**

The A.I. Root Co., and Bee Culture, The 'Magazine of American Beekeeping' will always be connected to the amazing history of Honey Bees and their Keepers. At our company headquarters we recently updated our pollinator friendly garden area in front of the offices along the main thoroughfare into our hometown of Medina, Ohio.

No landscape is complete without a few crabapple cultivars as they provide a radiance of sweetly scented cheerful color in early Spring and a wealth of pollinators, birds and other wildlife all season, with flowers in the Spring, habitat and shelter during the Summer, and the fruit that develops toward Fall. The fall leaf colors are usually spectacular as well.

Over 800 species of crabapples exist today and can fit into any soil type, pH and climate conditions from Zones 4-8. They grow best in full sun but can tolerate some shade, especially if they have resistance to certain leaf diseases. Crabapples originate from Central Asia, specifically in modern Kazakhstan. Romans took the species into Europe where they became extremely popular and were cultivated into many varieties. Later they were brought to North America and are widely used as ornamental favorites.

Crabapples are in the Rosaceae Family and are closely related to the orchard (edible) apples (*Malus domestica*), but the fruit is less than 2" in diameter and more astringent. They typically grow 15-25' tall and are usually as wide or wider with small dark green-bronze pointed leaves and a branching habit similar to cultivated apple trees, except for those with columnar or weeping habits. Branches are covered with clusters of flowers ranging from white-pink- to red before leaves emerge in the Spring and tend to hold the flowers for several weeks if weather conditions cooperate. The bark varies by species but is usually smooth with a greenish to brown hue.

Some popular species of crabapple in the United States are the Sweet or American crabapple (*Malus coronaria*); Oregon crabapple (*M. fusca*); prairie crabapple (*M. ioensis*); and southern crabapple (*M. angustifolia*). Perhaps the showiest and most fragrant is the Japanese flowering crabapple, *M. floribunda* which grows well in North America. Within each species are numerous cultivars with different growth forms, flower and fruit characteristics, disease resistance and Winter hardiness. The American crabapple is 15' and wide and less showy but it is highly valued by wildlife and still covered with blooms in the spring.

"Pink Princess", a fragrant, deep pink flowering crabapple grows well at the A.I Root Company garden in Medina Ohio. Other popular hybrids include "Adams", which is compact with irregular branching, carmine colored flowers fading to light pink, and ¼" indehiscent fruit that holds onto the fruit until spring (usually eaten by robins and cedar wax wings before any drop to the ground); "Madonna" is an upright cultivar reaching 10' with double white blossoms. The new leaves are bronze before turning green. "Molten Lava" has a weeping form with red flowers and 3/8" deep red berries that stay

M. floribunda – *"Adams"*

M. floribunda – *"Madonna"*

M. floribunda – *"Royal fountain"*

Malus coronaria

attached until December when they are gobbled by hungry birds.

Decades ago people were worried about the fruit dropping and making a "mess" however breeding has improved the ability of the trees to hang onto the fruits until they dry and normally all eaten. An evaluation was published on the crabapples grown at OARDC, Wooster Ohio in 1994 including shape, size, growth habit, fruit and flowers, and disease resistance of forty seven cultivars and can still be found online. Today, crabapples can be found with any shape, size and color and will enhance any garden, landscape and home. They provide a valuable source of nectar and pollen for honey bees and should be included in any pollinator garden. BC

http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=250253

https://www.gardenia.net/plant/malus-adams

https://www.englishgardens.com/weeping-madonna-flowering-crab/

https://www.jfschmidt.com/introductions/royalfountain/index.html

https://plants.ces.ncsu.edu/plants/malus-coronaria/

https://plantfacts.osu.edu/pdf/0247-721.pdf

OARDC_special_circular_n142 crabapple rating.pdf

https://hgic.clemson.edu/factsheet/crabapple/

https://naturewalk.yale.edu/trees/rosaceae/malus-x/crabapple-tree-32

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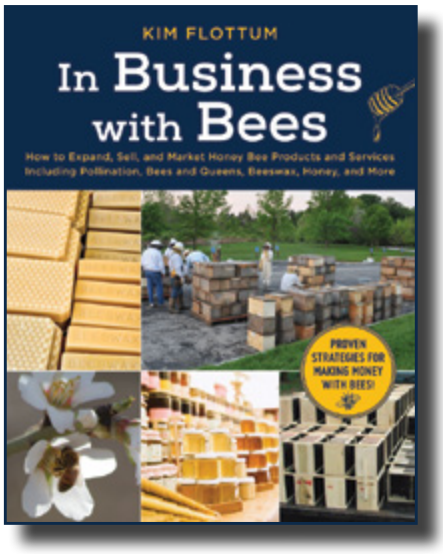

With this expert advice you can become as knowledgeable, confident, and successful in running a business as you are in beekeeping.

From the author of ***Backyard Beekeeper, Better Beekeeping, The Honey Handbook***, and with Marina Marchese ***The Honey Connoisseur.*** Over 30 years in the Beekeeping World, observing hundreds of successful beekeeping businesses.

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Summer Recipes –

HONEY JOES
1/4 cup onions, chopped
1/4 cup celery, chopped
1/4 cup carrots, grated
2 T vegetable oil
1 lb. ground turkey or beef
1/2 cup tomato paste
1/4 cup honey
3 T water
1 T vinegar
2 tsp. Worcestershire sauce
1½ tsp. chili powder
4 hamburger buns
salt and pepper, to taste

In a large pan over medium heat, sauté onions, celery and carrots in oil until soft. Stir in turkey; cook five minutes, stirring frequently, until turkey is browned and crumbly. Stir in remaining ingredients, except seasonings and hamburger buns. Simmer, covered, three to five minutes. Season to taste with salt and pepper.

Divide mixture evenly between hamburger buns to serve. Makes four servings.

Honey Strawberry Tea Cooler
1 pint fresh strawberries, stemmed and cleaned
1/4 cup honey
1 can (6 oz.) frozen orange juice concentrate
2 cups brewed green tea, cooled
1/2 cup water

In a blender or food processor container, combine water, strawberries and honey; process until smooth. Add orange juice concentrate; process until well blended.

Stir into cooled tea.

Serve over ice. Makes four servings.

Recipes taken from The National Board.

CALENDAR

♦INTERNATIONAL♦

2021 Beekeeping Tour To Slovenia September 9-24.

Prices are based on a minimum of 10 people. $3600, $200 deposit due by August 1. Remainder due August 15. Price includes everything with a few exceptions.

For information contact Suzanne Brouillette at **beeslovenia@gmail.com**.

♦ARKANSAS♦

Arkansas Beekeepers Association Fall Conference will be held September 24-25 in Mountain View.

For information please visit **arbeekeepers.org**.

♦INDIANA♦

Michiana Beekeepers Association Summer Meetings will be held July 18 - Sam Comfort; August 21 - James Tew.

For information visit **Michianabees.org**.

♦MINNESOTA♦

MN Honey Producers Summer Meeting will be held July 8-9 in Mankato.

Jim Gawenis, Sweetwater Science Labs, is the keynote speaker.

For information contact **Liz9120@hotmail.com**.

It is always possible to be thankful for what is given rather than to complain about what is not given. One or the other becomes a habit of life.

♦MISSOURI♦

Missouri State Beekeepers Fall Conference will be held October 8-9 at the University of Central Missouri in Warrensburg.

Speakers include Bob Binnie and Cameron Jack as keynote speakers.

For pre-registeration, hotel accommodations, and information visit **Mostatebeekeepers.org**.

♦PENNSYLVANIA♦

Delaware Valley University, Doylestown will hold its Introduction to Beekeeping, July 17, 18, 31 and August 1.

The course will cover honey bee biology and behavior; building an apiary and harvesting honey; apiary equipment and supplies; management practices for each season. The course is taught by Vince Aloyo.

For information or to register visit **http://vincemasterbeekeeper.com/courses/**.

♦SOUTH CAROLINA♦

2021 SC Beekeepers Summer Convention - in person will be held July 22-24 at Triden Technical College, 7000 Ribers Ave., North Charleston.

Speakers include Lori Bataller, Jamie Ellis, Ashley Burns, Ben Powell, Bill Kern, Mark Sweatman.

For information see **ttps://scstatebeekeepers.com**.

♦WISCONSIN♦

WI Honey Producers Fall Convention will be held November 4-6. at Hotel Mead Wisconsin Rapids.

Sue Cobey is the keynote speaker.

For information contact **Liz9120@hotmail.com**.

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Deep in the night, I awakened to the beep-beep-beep of a backhoe in reverse. "Good grief!" I thought. We're accustomed to 6:45 a.m. beeps at the never-ending construction project across the fence line. Now they're working at night? But it was only honey bee queens tooting in a box on the bedside table. The little darlings! My mind at ease now, I slipped back into dreamland.

It's early May as I write, and my new book – *A Beekeeper's Life – Tales from the Bottom Board* – is supposed to be on bookstore shelves, but it had to be reprinted a couple of times, due to spelling errors. The first mistake was a misspelling of the author's name – on the book's cover. Mistakes happen, sure – but the author's name? On the cover?

It didn't stop there. One of the book's testimonials was from Eugene Makovec, editor over at the *American Bee Journal*. But I spelled his name with a "k" at the end, instead of a "c". Look, you have to get names right. In journalism, it doesn't get any more basic. This one was on me. I'd double-checked the spelling. I wanted to make sure I got that "o" right. I didn't want it to come out Makavek or Makevek. But the "k" that should have been a "c"? I never saw it, because I sometimes have tunnel vision.

I had tunnel vision a few Springs ago, while I was making hive making splits and nucs. I'd divide a colony into two, or pull out five frames of brood and bees to make a nuc. Either way, I'd leave the old queen in the mother colony. Then I'd move the queenless colony – whether it was a split or a nuc – to a location at least a couple of miles away. That way I wouldn't have the problem of bees leaving their new home and going back to their old hive. I'd wait 24 hours and then install a queen in a cage with a candy plug. Letting the bees eat through a candy plug is the easy way to introduce a new queen, and it generally works.

I got so wrapped up in finding old queens, making divisions and putting in new queens, that I failed to notice that at a different yard the bees had gotten on a wicked dandelion honey flow. By the time I discovered this, these hives were packed tight with brood and honey, and I had swarm cells everywhere. It was too late to give them a honey super to relieve the congestion, so I had to make the best of an unfortunate situation.

I should take at least a partial tax write-off for my fishing trips with Paul. Only about half of his casual observations are about how to catch trout. The rest are about bees. He recently mentioned that he has practically 100 percent success releasing caged queens. And I thought my 80 percent queen acceptance was pretty good! He lets the bees eat through the candy plug, just like I do. But he often doesn't even bother to give the colony 24 hours separated from its old queen before he puts in a new one. One thing he does that I haven't been doing is push the queen cage down deep between the frames, so that if we have a cold night, the bees won't cluster up tight and abandon a queen trapped in her cage above them.

I suppose it could be the queens Paul buys, but I'm not so sure. He's somehow got the touch. I've seen this on the river, too.

Fishing can be a metaphor. Yesterday a couple of anglers took me to school. I'd caught one 12-inch brown – no trophy, to be sure -- at a location that can be a good place to catch large trout. There's not a lot of room to fish here, but I had the run to myself, until a young guy with a ponytail stopped by and got all chatty. I could sense it coming. He asked if he and his dad might fish alongside me. "We won't take much room," he assured me.

"Well, sure," I said.

Dry flies float on the surface of the water. Nymphs are artificial flies that you fish underwater. You might use a little weight to get these flies down where the fish are. My fishing neighbors were using nymphs, and I was using dries – two distinct fishing techniques. Just as they were getting started, I decided I was ready for a lunch break, so I said, "This spot's all yours."

After a sandwich and a nap in the car I decided to check back on those two nymph fishermen. They were catching – big ones. Yes, indeed they were! Sometimes they both had a trout on the line at the same time. I sat on the bank and watched. I should have walked right up and said, "Damn! Would you teach me exactly how you do that?" That would have meant conceding that they were the better anglers, however, and I was too proud for that. Pride will betray your best interests, every time.

Maybe your bees didn't make it through the winter. You did everything right. Of course you did. You've been keeping bees for five years. You've read all the books. You're an expert now. You've got it down.

But a veteran beekeeper down the road didn't lose any of her bees. Now how did that happen? Was it luck? Does she know something you don't? Does she have a better way? You could ask, if you're not too proud.

Ed **Colby**

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