YELLOW-LEGGED HORNET

OCT 2023

Catch The Buzz™

Bee Culture®

The Magazine Of American Beekeeping

www.BeeCulture.com

Saving Ukraine's National Beekeeping Institute and Museum

Mite Drop!

A Sting Operation

ROOT PUBLICATIONS

$4.99

R-32

R-7 R-7

Give your bees the ultimate winter protection

HiveHugger.com

ABF AMERICAN BEEKEEPING FEDERATION

2023 Innovation Award Winner

HIVE HUGGER®

Pierco
Genuine Beekeeping Equipment

Genuine Pierco
Manufactured in-house

FOR ALL YOUR BEEKEEPING NEEDS

CHECK OUT

www.Pierco.com

AgriSea Bee Nutrition

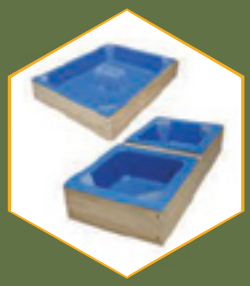
- Essential Amino Acid Profiles
- Individual Bee Mass (weight) Improved
- Reduction of Nosema
- No Residues in Honey
- Nutrients Sustaining Cell Metabolism

Pierco Genuine Beekeeping Equipment

Exclusive Supplier of AgriSea

MITE CONTROL

TOP FEEDERS



EXTRACTION

BEEKEEPING KITS

IN-HIVE FEEDERS

PROTECTIVE WEAR

WE OFFER DOUBLE & TRIPLE WAX

Frames - Plastic

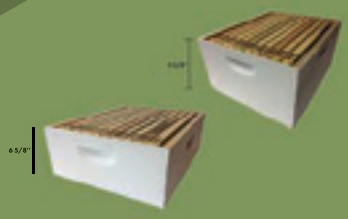
- Super Strong & Durable
- Safe - FDA food grade plastic
- Easy to use - No Assembly Required

Frames - Wood

- Stronger than Industry Standard
- New 1/2" thick end bars - 3/4" top bars
- Assembled, Glued, and Stapled

Snap-in Foundations

- Impervious to wax moths, rodents, and hive beetles
- Preferred by Professional Beekeepers
- Precision molded, perfect cells
- Easy to use - Snaps into wood frames



Commercial Grade Boxes

- Honey Supers & Hive Bodies
- Added Strength 1 - 5/8" Top Joint
- Honey Supers & Hive Bodies
- Added Strength 1 - 5/8" Top Joint

FREE SHIPPING *See website for details

Table of

October Bee Culture...

Cover Photo by Stephanie Ady-Adams as part of our Image Gallery Photo Contest.

800.289.7668
Executive Publisher – Brad Root
Associate Publisher, Senior Editor – Jerry Hayes, Jerry@BeeCulture.com, Ext. 3214
Layout and Design – Emma Wadel, Emma@BeeCulture.com, Ext. 3220
Advertising and Customer Service – Jennifer Manis, Jen@BeeCulture.com, Ext. 3216

Contributors
Clarence Collison • James E. Tew • Kim Lehman • John Miller • Ed Colby
Jay Evans • Ross Conrad • Tracy Farone • Bridget Mendel • Becky Masterman

POSTMASTER: Send address changes to
BEE CULTURE, The A.I. Root Co., 623 W. Liberty St., Medina, OH 44256

Subscription Information
U.S., one year print, $34; two years print, $62; one year digital, $24; one year print and digital bundle, $44; two years print and digital bundle, $70. All other countries, (U.S. Currency only), one year print, $74; two years print, $148; one year digital, $24; one year print and digital bundle, $79; two years print and digital bundle, $158. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), October 2023, Volume 151, Issue 10, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

Subscriptions, Book Orders – www.BeeCulture.com • info@BeeCulture.com

Advertising – 800.289.7668, Ext. 3216; Jen@BeeCulture.com

Contents

Find the Honeycomb Hannah cartoon on page 95!

Important Note from *Bee Culture:*
We have changed subscription services! As many of you may have experienced, our previous subscription service wasn't the most user-friendly for purchasing subscriptions, changing your mailing address, etc. We've been hard at work finding a new system that works well for us and is the best experience for you! Almost everything will be the same with the exception of a couple of changes:
- Each person has a new renewal code. It will be a series of numbers and it is on the address label, just like before.
- To log in, all you need is your renew code and zip code. If you don't know your code, make sure an email is attached to your account and it can be found that way.
- Updating your information should be easier now. When you log in, there will be an area to change your information as well as a place to add another address.
- For everyone that flips between two addresses during the year, there is a system where we can have it automatically update based on a calendar date. Reach out to us to get it set up!
- For digital and bundle subscribers only: the log in system for the digital will be under a separate system. For the best experience, make sure the email matches your subscription account and the digital access account. All subscriptions are still purchased together in one place, it's just the log in to see the digital issues.

If at any point you run into problems or have any questions, please email us at **jen@beeculture.com**.

NEXT MONTH

Region 1
- Set up wind break(s)
- Install mouse guards
- 50+ lbs stored food
- Getting too late to treat for *Varroa* for healthy Winter bees
- Feed syrup if needed
- Finish Winter wrapping
- Consolidate equipment
- Clean up beeyard
- Provide top ventilation
- Check bear fence

Region 2
- Reduce entrances
- Check honey stores
- Manage for skunks
- Add mouse guard
- Feed if needed to bring weight up
- Organize equipment for Spring

Region 3
- Check colony weight
- Feed if needed
- Put up wind breaks
- Equalize honey stores
- Monitor hive beetles
- Rotate out old combs
- Repair equipment

Region 4
- Mouse guards
- Feed if still below minimum
- Wrap colonies at Thanksgiving
- Set up wind breaks
- Feed
- Get ready to go to California
- Finish mite treatment before they go to California
- Insulate lid
- Make candy boards

Region 5
- Wrap for Winter
- Mouse guards
- Bee sure wind breaks are up
- Last feeding if necessary
- *Varroa* treatments should be done
- Done, nothing left

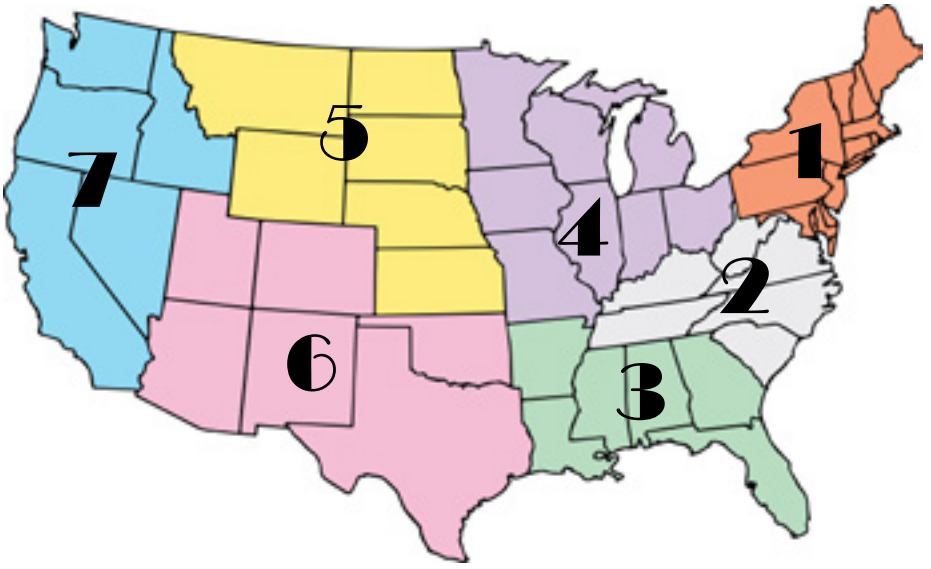
Region 6
- Confirm mite count is down
- Bee sure 30 to 40 pounds of honey are stored
- Insulate colonies
- Put on entrance reducers
- Put on top insulation
- Store equipment so wax moths don't have a meal

Region 7
- Wrap colonies
- Put up wind breaks
- Add candy boards if needed
- Move to Winter locations
- Cover hives
- Leave them alone
- Possibly reduce from two brood boxes to one
- Open upper entrances

Honey Reporters Wanted

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

Scan this to go straight to the form online!



OCTOBER – REGIONAL HONEY PRICE REPORT

	REPORTING REGIONS										History	
	1	2	3	4	5	6	7					
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS								**Range**	**Avg.**	**$/lb**	**Last Month**	**Last Year**
55 Gal. Drum, Light	2.39	2.30	3.13	3.11	2.74	3.00	3.50	2.00-4.00	2.91	2.91	2.91	2.78
55 Gal. Drum, Ambr	2.27	2.89	2.83	3.07	2.61	2.85	3.18	2.00-3.60	2.85	2.85	2.89	2.67
60# Light (retail)	230.83	301.50	291.33	220.57	245.00	249.50	310.00	120.00-420.00	253.12	4.22	248.44	225.91
60# Amber (retail)	238.21	283.33	274.67	214.67	220.00	248.00	248.33	120.00-390.00	246.00	4.10	245.45	218.57
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	104.49	115.80	96.00	101.10	87.36	90.00	-	67.20-144.00	103.44	8.62	105.53	104.55
1# 24/case	170.04	184.80	171.60	135.98	151.42	148.44	144.00	96.00-288.00	161.87	6.74	164.80	162.38
2# 12/case	152.22	192.00	162.67	124.37	173.76	151.50	156.00	84.00-264.00	148.81	6.20	148.35	149.86
12.oz. Plas. 24/cs	141.05	143.28	140.67	109.71	121.32	117.48	117.60	72.00-260.00	128.57	7.14	127.53	127.52
5# 6/case	164.88	240.00	-	138.48	143.19	136.00	-	96.00-330.00	160.77	5.36	165.31	161.12
Quarts 12/case	194.17	214.00	200.92	170.56	200.40	200.94	205.50	83.76-300.00	197.06	5.47	194.93	178.68
Pints 12/case	119.25	146.40	106.22	111.02	170.00	139.50	115.20	72.00-270.00	127.32	7.07	115.24	112.03
RETAIL SHELF PRICES												
1/2#	6.18	7.04	5.34	6.00	5.45	6.30	-	3.00-11.00	6.17	12.34	6.03	6.09
12 oz. Plastic	7.61	8.59	7.46	7.48	7.02	7.06	6.38	1.50-13.00	7.63	10.17	7.54	7.24
1# Glass/Plastic	10.74	11.25	10.32	9.20	13.68	10.06	10.50	5.79-30.00	10.49	10.49	10.38	9.78
2# Glass/Plastic	16.56	20.89	18.82	17.54	21.55	14.86	20.00	7.29-32.00	17.76	8.88	17.39	16.18
Pint	12.56	14.79	12.94	12.83	18.82	13.33	12.38	7.00-30.00	13.39	8.93	12.97	11.82
Quart	23.62	23.39	21.31	21.57	24.53	18.00	22.08	12.00-42.00	22.20	7.40	22.38	20.76
5# Glass/Plastic	37.43	40.99	44.50	32.49	38.85	35.40	-	19.99-65.01	37.13	7.43	35.56	34.87
1# Cream	13.38	10.67	13.50	11.47	9.99	10.00	15.00	7.12-30.00	12.60	12.60	12.77	11.04
1# Cut Comb	15.66	16.92	15.25	15.64	12.00	20.00	-	6.00-30.00	15.80	15.80	15.78	13.33
Ross Round	11.40	18.25	18.00	12.67	-	-	15.25	8.00-24.00	14.43	19.24	13.55	13.30
Wholesale Wax (Lt)	6.50	8.24	7.19	7.55	7.50	6.00	5.60	3.00-10.00	6.98	-	7.44	7.68
Wholesale Wax (Dk)	4.39	7.32	7.88	7.29	8.00	4.25	-	2.25-10.00	6.36	-	6.26	6.58
Pollination Fee/Col.	100.05	79.00	97.50	127.50	200.00	-	75.00	5.55-250.00	102.88	-	104.93	90.94
Price of Nucs	184.50	181.36	167.50	186.88	185.00	205.00	201.00	115.00-299.00	184.45	-	180.64	-
Price of Packages	164.77	139.17	130.00	148.00	156.50	145.00	200.00	100.00-215.00	152.78	-	152.67	-

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

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

Average Honey Flow Time and Amount per Region

Region 1:
Timing of Flow: Normal
Amount of Flow: Average

Region 2:
Timing of Flow: Normal
Amount of Flow: Average

Region 3:
Timing of Flow: Normal
Amount of Flow: Average

Region 4:
Timing of Flow: Normal
Amount of Flow: Average

Region 5:
Timing of Flow: Late
Amount of Flow: Heavy

Region 6:
Timing of Flow: Normal
Amount of Flow: Light

Region 7:
Timing of Flow: Normal
Amount of Flow: Light

Mite Treatment per Region

Region 1: Most used a Formic product.
Region 2: Most used a Thymol product.
Region 3: Most used either a Thymol product or no mite treatment due to honey flow.
Region 4: Most used a Formic product.
Region 5: Most used either a Thymol product, a Formic product, a non-chemical treatment method or no mite treatment due to honey flow.
Region 6: Most used either an Oxalic Acid Vapor product or an Amitraz product.
Region 7: Most used either an Oxalic Acid Vapor product, a Thymol product or an Amitraz product.

Top Blossoming Plants per Region

Region 1: Goldenrod, Clover, Milkweed, Bird's-foot Trefoil, Soybean
Region 2: Goldenrod, Sourwood, Chicory, Sumab
Region 3: Cotton, Crepe Myrtle, Soybean, Wildflowers, Goldenrod
Region 4: Soybean, Clover, Goldenrod, Sweet Clover, Sunflower, White Sweet Clover
Region 5: Alfalfa
Region 6: Crepe Myrtle, Sunflower
Region 7: Fireweed, Sunflower

Overall Top Blossoming Plants

Goldenrod, Sunflower, Clover, Soybean, Crepe Myrtle, Wildflowers, Cotton, Milkweed

FOUND IN TRANSLATION

Mite Drop!

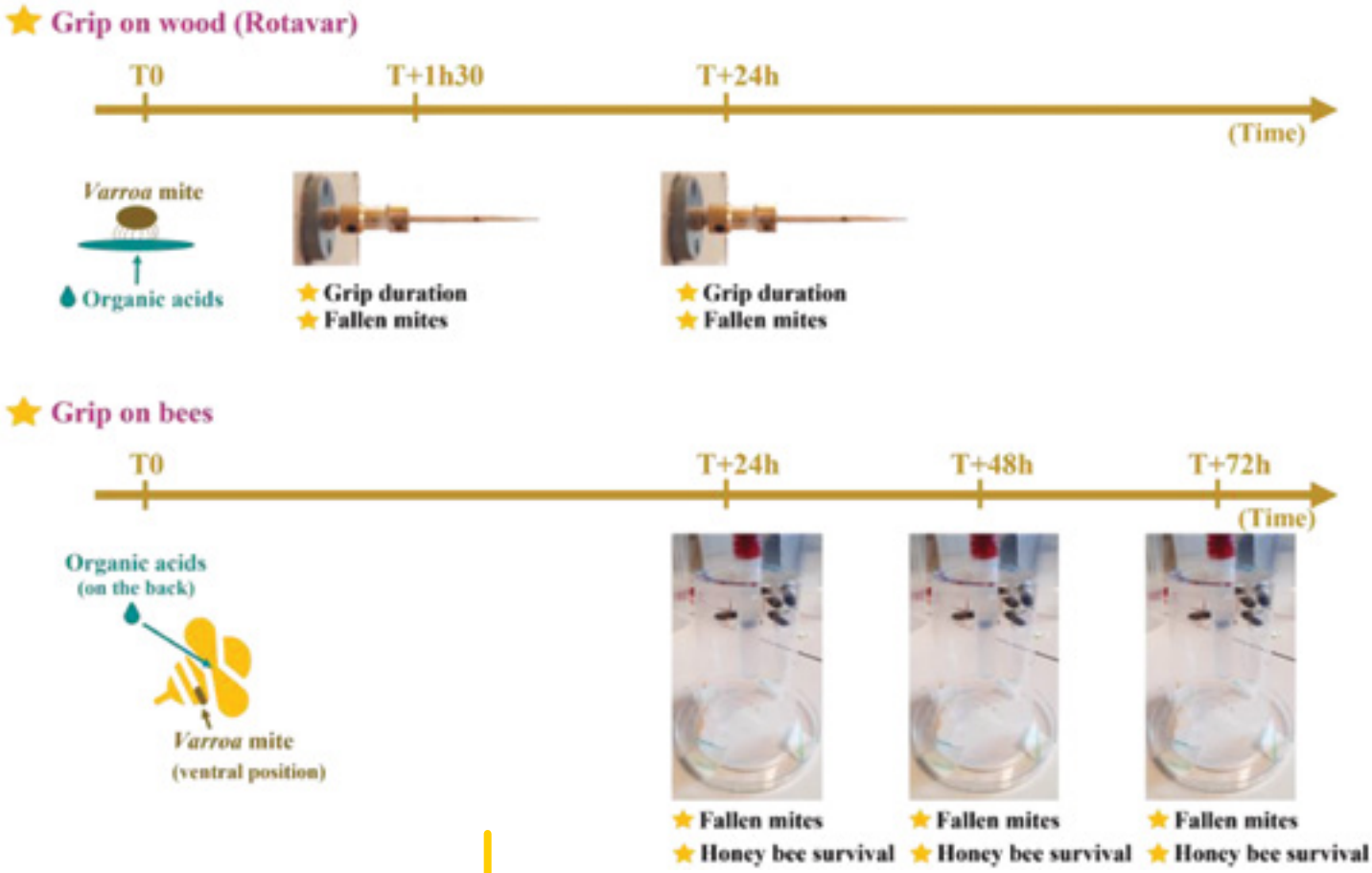
Jay Evans, USDA Beltsville Bee Lab

Listen along here!

Varroa mites remain the primary source of honey bee colony losses for beekeepers managing from one to 10,000 colonies. Scientists like us and ardent beekeepers are always on the hunt for new ways to reduce *varroa* damage to bees and their colonies. One intriguing strategy is to make mites simply fall off their adult bee hosts. Short of changing the electric charge of host or parasite, this repellency can come from 1) making hosts less grippy, 2) somehow clogging the incredibly strong tarsi (feet with 'toes' and a spongy, oily, arolia) of mites or 3) affecting mite behavior by making them less likely to find safe spots and hang on to their bees for dear life. Dislodged mites are far more vulnerable to hygienic worker bees and might also simply keep falling down to a hostless, hungry and hopefully, short life. This is probably a central reason that female *varroa* mites spend very little time wandering the combs of beehives unless they are moments away from entering the brood cell of a developing bee. While on adult bees, mites have much incentive to stay right there, whatever their host is doing to drop them.

How do mites adhere to their bees so strongly? When mites are actively feeding on bees they are extremely hard to dislodge, since they are partly under the hardened plates of the bee itself and are gripping with a combination of 'teeth' and tarsi. Even while taking a break from feeding, mites know to find safe spots on the bee to attach, favoring locations on the abdomen or thorax that are both hairy and away from swinging legs and biting bee mandibles. How can one make them quit their bees given so many hiding places?

Caroline Vilarem and colleagues in France recently described an ambitious attempt to document the abilities of mites to hang onto surfaces when exposed to organic acids (Vilarem, C.; Piou, V.; Blanchard, S.; Vogelweith, F.; Vétillard, A. *Lose Your Grip: Challenging* Varroa destructor *Host Attachment with Tartaric, Lactic, Formic, and Citric Acids*, Appl. Sci. 2023, 13, 9085. **https://doi.org/10.3390/app13169085**). These scientists deployed one of the coolest low-tech tools to measure how well mites grip onto a surface. While their 'Rotavar' sounds both complex and expensive, it is actually a 'motor-driven rotating toothpick'. Yes, you can do this at home, with a slow (three or so revolutions per minute) motor and a supply of toothpicks. The authors add to that an extremely careful experimental design and complex statistics to show the different abilities of mites to hang onto sticks and bees coated with acetic, citric, lactic, formic and tartaric acids. The results hint at new modes and new candidates for mite control, with the usual caveat that converting a controlled lab assay to field colonies will be challenging.



Schematic diagram of the experimental design and measured parameters. Grip on wood (Rotavar): This method relies on direct contact between Varroa*'s arolia and the organic acids. The Rotavar set-up is a motor-driven rotating toothpick used to assess* V. destructor*'s grip. Grip on bees: the host attachment experiment applies acids to the backs of honey bees to remove mites. T0 represents the administration time for treatments; T + 1 h 30, 24 h, 48 h, or 72 h stand for the time post administration used to make measurements. Figure from https://doi.org/10.3390/app13169085*

Some highlights: First, acidity itself does not seem to be the solution. Most notably, even high doses of acetic acid had little impact on the abilities of mites to grab toothpicks and this candidate was quickly discarded. So, what can we glean from the differences between the tested acids? Tartaric acid worked great at dislodging mites from spinning toothpicks but was surprisingly poor at dislodging mites from bees. Prior work suggests that the mode of action for tartaric acid is, at least in part, toxicity towards mites. It is possible that the levels of tartaric acid needed to coat bees with a toxic dose are higher than they are on a relatively smooth and barren toothpick. Toothpicks also attract watery compounds (hydrophilic) while bees are coated with oils and are hence more water-repellent (hydrophobic). Maybe the availability of tartaric acid on toothpicks is higher than it would be on oilier bee bodies. Formic acid also worked much better on the wood surface than on bees, an intriguing insight for a well-used and effective mite control. Formic acid is also known to be directly toxic to mites and their cells, and the authors make clear that both direct toxicity and grippiness are clear and perhaps synergistic targets for mite control. The widely used miticide oxalic acid also wins by being directly toxic to mites at levels that are relatively safe for bees, demonstrating that there are many possible ways to turn organic acids into effective treatments.

Lactic acid came out as the best candidate in the study group for divorcing mites from their bees. This acid worked well at dislodging mites from both toothpicks and bees. Lactic acid does not appear to be highly toxic to mites and instead seems to act by changing the mechanics of hanging on. This is a nice lead for exploring acids with similar qualities for their abilities to both grease the 'Rotavar' and make bees a more slippery host. In another intriguing result from this nice study, mites that simply walked across paper holding lactic acid were then less good in future grip tests. What is it about lactic acid that burns, cleans or otherwise insults the complex and surprisingly 'soft' tarsi of mites?

If this topic has gripped you, consider reading up on the field thanks to a recent open-access paper on stickiness by graduate student Luc van den Boogaart and colleagues in the Netherlands (van den Boogaart, L.M.; Langowski, J.K.A.; Amador, G.J. *Studying Stickiness: Methods, Trade-Offs, and Perspectives in Measuring Reversible Biological Adhesion and Friction.* Biomimetics 2022, 7, 134; **https://www.mdpi.com/2313-7673/7/3/134**). For those of us who have stored 'Freshman Physics' in a remote hard drive, they give a clear review of how these forces work across organisms; in their words 'from ticks to tree frogs'. Maybe their figures and insights will inspire a beekeeper or scientist to dream up a safe, effective route to dislodge mites from bees and prevent them from climbing back on. Pulling in people with a knowledge of physics, or just really good imaginations and the ability to build and deploy Rotavars (imagine how entertaining those can be, *a la* squirrel spinners... **https://www.youtube.com/shorts/nBKb_z4_tGY**), can only help in the hunt for new mite controls and healthier bees. BC

Yellow-legged Hornet
What does this mean for beekeepers?

The Yellow-legged Hornet, *Vespa velutina*, has been discovered in the state of Georgia! This social wasp, native to Asia, preys extensively on honey bees and other pollinators. Its arrival in North America, while not wholly unexpected, is a cause for alarm for beekeepers and agriculture in general. What is this wasp? Why is it a concern? What can we do to control it? And how concerned should we be at this time?

What is the Yellow-legged Hornet?

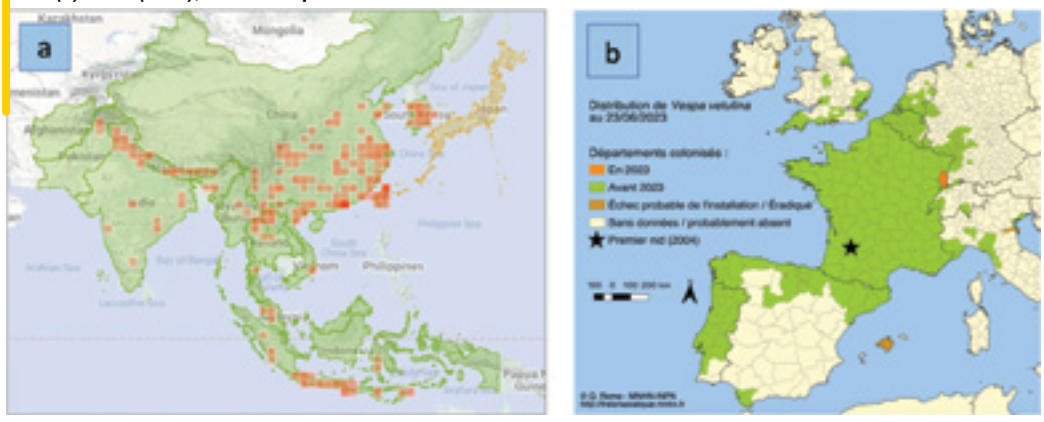
V. velutina is a large wasp, approximately 0.7–1.0 inch (1.7–2.5 cm) in length and with distinctive yellow legs (Fig. 1). It is a social insect, with colonies composed of numerous workers and a slightly larger queen (Pérez-de-Heredia et al., 2017). The species has been studied extensively, both within its native range and in the regions of western Europe, South Korea and Japan it has invaded. Its colonies, founded by a single mated queen, become more populous as Summer progresses. By late Summer, its large, round papery nests, usually concealed by leaves in tree-tops, contain hundreds of worker hornets. To feed their larvae, they capture a wide variety of insects, with the Western Honey Bee (*Apis mellifera*) being a favored prey species, in part because stationary honey bee colonies provide food consistently for weeks on end (Fig. 1; Roy, 2023). Laurino et al. (2020) provided a review of the biology of the species and its invasion of Europe, where programs to control the species cost millions of dollars annually.

Vespa velutina naturally inhabits a region that extends from northern China south through Indonesia and Southeast Asia, and westward along the foothills of the Himalayas to Afghanistan (Fig. 2a). Over that range, it occurs in 13 different color forms (formerly referred to as subspecies). It is likely that the hornets in Georgia are of the northern mainland form, *V. velutina nigrothorax*, that has also invaded Europe (Fig. 2b) and northeastern Asia. *V. v. nigrothorax* has often been inappropriately referred to in much of the literature written about it as the "Asian hornet", a misnomer given that all 22 species of hornets inhabit some part of Asia!

The life cycle of the Yellow-legged Hornet is generally the same as that of all species of hornets (i.e., wasps in the genus *Vespa*) in temperate climates (Laurino et al., 2020). A mated queen emerges from her wintering site and becomes active in Spring when the weather becomes suitable. After a period of feeding on floral nectar and tree sap, followed by dispersal estimated to exceed 30 miles (50 km) in some instances, she individually constructs a small comb enclosed within a papery envelope made from plant fibers she chews and mixes with her saliva. The queen then rears the first generation of hornets by herself in an "embryo nest." When those first workers have completed their development and emerge as adults, they take over most colony activities (nest construction, brood care, foraging and colony defense) while the queen continues to lay most, if not all, eggs. Towards Fall, the colony rears new queens and males. Those new queens mate with males, search for a wintering site that is usually in soil, leaf litter or rotten wood, and become quiescent for several months while temperatures are too cool for activity. It is while they are in Winter diapause that the queens can be accidentally transported long distances as stowaways among cargo on ships and, less frequently, on planes. This is almost certainly how Yellow-legged Hornets arrived in Georgia: the sites where the first individuals were discovered are within 12 miles of the Port of Savannah, one of the largest shipping ports in North America that receives cargo from everywhere in the world.

One important difference between the Yellow-legged Hornet and other species is the relatively large number of males with which young queens mate. The majority of hornet species that have been studied, mate with one or sometimes two males. In contrast, *V. velutina* queens mate with three males on average (range from one to 5+). The invasion of Europe by this species is believed to have originated from a single queen, mated with four males, that was accidentally imported to southwestern France (Fig. 2b). The added genetic variability provided by mating with several males has undoubtedly

Figure 2. Distribution of* V. veluntina *(a) in Asia where it occurs naturally and has been introduced to South Korea and Japan, and (b) in Europe where it has been introduced. The red dot indicates where the first hornets were discovered in 2004. (Maps from (a) iNaturalist.org and (b) INPN (2023), used with permission of Quentin Rome / MNHN



in North America

Gard W. Otis

Figure 1. Left – Yellow-legged Hornet, Vespa velutina, *at rest. Right – A Yellow-legged Hornet hovers in front of a hive, awaiting incoming forager bees. Photos taken in France, courtesy of Patrick Le Mao and Quentin Rome / Muséum national d'Histoire naturelle, Paris, France, respectively.*

contributed to its successful invasions (reviewed by Otis et al., 2023).

Vespa velutina colonies can become very large. Quentin Rome and his colleagues (2015) collected nests in southwestern France from June to November and quantified their populations of immature and adult hornets. The colonies, generally initiated in March, had an average of 440 worker hornets by late October and early November. Some of those nests remained very small, but the most populous colony had 1,740 workers (News reports that colonies may contain 6,000 or more workers are erroneous). Mature colonies in Fall contained an average of 190 new queens (Rome et al., 2015), but because young queens only remain in their nest for about two weeks, that number must represent only a portion of all queens reared. I estimate that the average number reared is approximately 300–400 per colony. The greatest number of new queens collected inside one single nest was 463.

In an odd quirk of biology, hornet larvae serve as reservoirs of food within their colony. Larvae convert the proteins in chewed-up insect prey collected by worker hornets into amino-acid rich sugars. They then feed those secretions to young queens, resulting in them increasing in weight by 20–40% within one to two weeks of emergence as adults due to deposition of fat that fuels their survival during several months of Winter diapause. Young males also require the nutrients provided by larvae in order to mature sexually. Because hornets do not store honey in their nests, the sugary secretions from larvae also sustain their colonies during periods of inclement weather when foraging is not possible (reviewed by Otis et al. 2023).

How does the Yellow-legged Hornet affect honey bees and other pollinators?

The greatest concern related to the establishment of Yellow-legged Hornets in North America is their effects on honey bees and other pollinators. These hornets capture a wide variety of flying insects, a high percentage of which are pollinators, to feed to their larvae. Honey bees in particular are heavily preyed upon. Hornets hover near a hive entrance, facing outwards, so they can pick off incoming foragers (Fig. 1). Once a hive has been located, a hornet can return repeatedly to prey upon the essentially defenseless honey bees. Dr. Yves Le Conte, former head of the French honey bee research unit in Avignon, told me that by late Summer, when honey bees colonies should "prepare good Winter bees and collect honey for Winter survival, the hornets put pressure on the bees." Hornets seem to focus on weaker colonies and in some cases, once they have killed most of the bees in a hive, they may enter and eat both the brood and the honey. In addition to the constant attrition of foraging bees, the presence of multiple hornets at the entrance of a colony causes "foraging paralysis" in extreme cases, flight activity is completely suppressed. The reduced foraging results in low honey stores and Winter starvation, with losses of 30–50% often reported (Yves Le Conte, pers. comm.; Requier et al., 2019). This hornet is a very significant threat to honey bees!

What has happened in Georgia in 2023?

From the information I have been able to obtain, Yellow-legged Hornets were first observed on or before August 1st by Sarah Beth Waller (personal communica-

tion), the beekeeper at the Savannah Bee Company on the eastern edge of Savannah where they were feeding on fallen pears. She posted a photo to iNaturalist on August 7th that yielded a tentative identification of the hornet as *Vespa velutina* (iNaturalist, 2023). Also in early August, a beekeeper somewhere in Savannah (at a date and location that have yet to be revealed by the Georgia Department of Agriculture) collected two hornets as they visited his hives. They were identified first by a University of Georgia entomologist and subsequently confirmed by the USDA on August 9th (GDA, 2023a). Thanks to news reports on August 15th about this discovery, a homeowner in the vicinity of the Savannah Bee Company reported a large nest 75 feet up in a pine tree. That nest, destroyed on the evening of August 23rd, proved to be exceptionally large (GDA 2023a, b). Keith Delaplane (University of Georgia) informed me that hornet traps of an unknown type have been deployed by the GDA from Port Wentworth to the mouth of the Savannah River, a distance of 18 miles. One person I interviewed was of the understanding that the first two locations where the hornets were observed are approximately eight miles apart, which, if true, would suggest that additional colonies may be present (hornets usually forage within a mile of their nest). Hornets have been sent for genetic analysis to determine if they originated in Europe or Asia. The situation in Savannah is fluid and changing rapidly. By the time this article is published, much more will be known and divulged. It may take a year or more before we know whether this incipient infestation has been eradicated.

What can be done to reduce the threat posed by the Yellow-legged Hornet?

Traps of many designs have been developed and tested in Europe. They have proven moderately effective for monitoring the presence of the hornet, but do not catch sufficient hornets to appreciably affect established colonies. Moreover, they have been criticized for their extensive by-catch of non-target insects. If the traps that have been deployed in Georgia capture additional hornets, finding and destroying their nests before new queens disperse into the environment presents the greatest probability of successful eradication. As an example, in spite of repeated discovery of Yellow-legged Hornet colonies in southern England, coordinated efforts of agricultural personnel, beekeepers and scientists have so far been successful at preventing the wasp's establishment in the United Kingdom (Jones et al., 2020). On the Mediterranean island of Mallorca, the combination of Spring trapping of gynes before they establish nests, baiting for foragers, and triangulating and destroying colonies before they produce new queens, eliminated the initial infestation. There have been some successes in using very lightweight radio transmitters to track *Vespa* hornets to their nests (Kennedy et al., 2018; Looney et al. 2023). After a few years, however, once a population of hornets has become established, the proportion of nests that can be found and destroyed has proven in several European countries, to be insufficient to control the invasion.

Monitoring by state departments of agriculture (e.g., see the online form set up for reporting in Georgia; GDA 2023a) or through community-scientist platforms such as iNaturalist can provide accurate reporting of exotic hornets and other pests. Beekeepers can play a huge role in early detection of non-native hornets because several species that have the potential to become established in North America prey extensively on honey bees. Any wasp that seems unusual can be photographed or caught in a jar, then compared with similar species (USDA-APHIS, 2023). It should be reported if you suspect it is *V. velutina* or another non-native species.

Where is the Yellow-legged Hornet likely to survive in North America?

GIS technology coupled with climate data for localities throughout the world that are available online have revolutionized our ability to predict potential distributions of species outside of their native ranges. In the case of the Yellow-legged Hornet, climate variables from where the species has been documented in Asia as well as in its introduced range in France, were analyzed along with climate data for sites throughout the rest of the world. A map showing the probability of suitable climate for hornet survival was created (Villemant et al., 2011). I superimposed the North American portion of that map onto a map of the United States, then modified it to show the approximate regions in North America where *Vespa velutina* would almost certainly be able to survive and reproduce (Fig. 3).

A large area of southeastern USA is predicted to have climate suitable for *V. velutina*. That region extends from the southern tip of Texas north into Oklahoma, then eastwards to somewhere between Baltimore and New York (Fig. 3.). Hornet survival may even be possible as far north as Boston and southern Ontario (Villemant et al., 2011). On the west coast, there is a zone in the rain shadow of the coastal mountains, from Vancouver, Canada, south into California, that seems prone to invasion. The hornet

Figure 3. Regions of North America with climate well suited to Yellow-legged Hornet survival. Other regions with lower climate suitability not shown. Adapted from Villemany et al. (2011).

Figure 4. The Northern Japanese Hornet,* Vespa mandarinia, *a species that invaded the Pacific Northwest in 2019. Photo taken by Aline Horikawa near Kyoto, Japan, and used with her permission.

is likely to do better where the minimum temperature in Winter is not too cold, relative humidity is fairly high and the maximum temperature in Summer is not too hot.

What about other exotic species of hornets?

Who can forget the "invasion by murder hornets" in 2019–2021? The Northern Giant Hornet (formerly known as the Asian Giant Hornet), *Vespa mandarinia*, is a huge social hornet (Fig. 4; also, refer to the image within YLH lookalikes" in USDA-APHIS, 2023) that is infamous for its ability to rapidly slaughter entire colonies of *Apis mellifera.* Its discovery in Fall of 2019 led to an extensive monitoring and eradication effort that is on-going in Washington state and British Columbia. Following a peak of 35 sightings and specimens in 2020, there were only 10 reports in 2021 (Looney et al., 2023). Since then, there have been no Northern Giant Hornets detected in North America, and there is optimism that the introduction of this species has failed. It is not clear what combination of factors is responsible for the decline in its population: relatively unsuitable climate, low genetic diversity, destruction of nests (one in British Columbia, four in Washington state; Looney et al. 2023) or other factors. It is known that relatively few species that reach foreign lands are successful in establishing permanent populations. We may simply have gotten lucky with the recent Northern Giant Hornet introduction.

Several groups of researchers have modeled the potential distribution of *V. mandarinia.* All of them yielded a strong probability of it surviving in the Pacific Northwest where it was initially discovered as well as a large region of eastern North America; however, these models fail to agree on the regions in the east that are most prone to invasion. Because this species focuses its predation in late Summer and Fall on social insects, including honey bees, beekeepers are again the group most likely to encounter it. If you see any wasp attacking and killing honey bees, you should report it immediately.

The Oriental Hornet (*Vespa orientalis*: Fig 5.), naturally inhabits the Mediterranean, Middle Eastern and western Asian countries and is the only hornet species adapted to hot, arid climates. This striking reddish brown hornet is an agricultural pest that attacks honey bee colonies and damages fleshy fruits such as grapes. It has already been detected in at least 10 countries outside of its native range (reviewed by Otis et al., 2023), and has successfully colonized southern Spain and Chile. Young queens often Winter in groups (Eran Levin, pers. comm.), a behavior which may have helped it to overcome genetic bottlenecks. Species distribution modeling suggests it has a high probability of successfully colonizing the Gulf Coast region of the United States as well as central California.

I would be remiss not to mention the European Hornet, also a large wasp that could be mistaken for one of the other species mentioned (USDA-APHIS, 2023). It was accidentally introduced to New York City nearly 180 years ago and has become relatively common in much of Eastern North America, but because it rarely captures honey bees and has relatively small colonies, it has not proven to be a concern for beekeeping.

Conclusion

Several hornet species cause extensive damage to honey bee colonies in other parts of the world. Unlike *Varroa* mites and small hive beetles, hornets do not inhabit bee colonies and would be very unlikely to be transported with hives when they are moved for pollination. However, they do have the potential to arrive at any port and subsequently be transported by trucks and trains anywhere in North America! The establishment of any of the exotic hornets discussed before would cause extensive disruption to beekeeping due to their predation on bees and secondary effects on Winter colony survival. The propensity of these hornets to attack honey bees makes beekeepers the most likely people to encounter them, as demonstrated recently with the detection of the Yellow-legged Hornet in Georgia. Readers are encouraged to learn how to identify them: review the figures in this

Figure 5. The Oriental Hornet,* Vespa orientalis, *a demonstrated invader in northern Italy, southern France, Sardinia, southern Spain, eastern Europe and Chile. Photo taken by Nicola Addelfio near Palermo, Sicily, Italy, and used with her permission.

article and "lookalikes" in USDA-APHIS (2023). Stay vigilant—and let's hope that we remain "hornet-free" for many years to come.

Acknowledgments

I am indebted to Lien T.P. Nguyen of Vietnam and Heather Mattila of Wellesley College, MA, my hornet research collaborators, for the knowledge and experiences they have shared with me over the past decade. Staff at the University of Georgia, K. Cecelia Sequira of USDA-APHIS, and Sarah Beth Waller shared important information about the Yellow-legged Hornet detection in Georgia up until 27 August, 2023. I must also recognize the dozens of wasp biologists worldwide who have willingly answered my many naive questions about hornets. BC

Gard W. Otis
School of Environmental Sciences, University of Guelph, Ontario, Canada
Institute of Bee Health, University of Bern and Agroscope, Bern, Switzerland

Selected References

GDA (2023a). Georgia Department of Agriculture press release (Aug. 25, 2023). **https://agr.georgia.gov/pr/yellow-legged-hornet-nest-eradicated-savannah-area**

GDA (2023b) Georgia Department of Agriculture press conference (Aug. 25, 2023). **https://www.facebook.com/watch/live/?ref=watch_permalink&v=639982398259487**

iNaturalist (2023). Yellow-legged Hornet (*Vespa velutina*). **https://www.inaturalist.org/taxa/119019-Vespa-velutina**

INPN (2020). Le frailon asiatique, *Vespa velutina*. (The Asian Hornet, *Vespa velutina*). Inventarie National du Patrimoine Naturel. (**http://frelonasiatique.mnhn.fr/**)

Jones E.P., C. Conyers, V. Tomkies, et al. Managing incursions of *Vespa velutina nigrithorax* in the UK: an emerging threat to apiculture. *Scientific Reports* (2020) 10:19553. **doi: 10.1038/s41598-020-76690-2**

Kennedy P.J., S.M. Ford, J. Poidatz, et al. (2018). Searching for nests of the invasive Asian hornet (*Vespa velutina*) using radiotelemetry. *Communications Biology* 1: 88. **doi: 10.1038/s42003-018-0092-9**

Laurino D, S. Lioy, L. Carisio, et al. (2020). *Vespa velutina*: an alien driver of honey bee colony losses. *Diversity* (2020) 12: 1–15. **doi:10.3390/d12010005**

Looney, C, B. Carman, J. Cena, et al. (2023) Detection and description of four *Vespa mandarinia* (Hymenoptera: Vespidae) nests collected in Washington State, USA. *Journal of Hymenoptera Research* 96: 1–20. **https://doi.org/10.3897/jhr.96.99307**

Otis, G.W., B.A. Taylor, and H.R. Mattila (2023). Invasion potential of hornets (Hymenoptera: Vespidae: *Vespa* spp.). *Frontiers in Insect Science* 3: 1145158. **https://doi.org/10.3389/finsc.2023.1145158**

Pérez-de-Heredia, I, E. Darrouzet, A. Goldarazena, et al. (2017). Differentiating between gynes and workers in the invasive hornet *Vespa velutina* (Hymenoptera, Vespidae) in Europe. *Journal of Hymenoptera Research* 60: 119–133. **https://doi.org/10.3897/jhr.60.13505**

Requier, F., Q. Rome, G. Chiron, et al. (1019), Predation of the invasive Asian hornet affects foraging activity and survival probability of honey bees in Western Europe. *Journal of Pest Science* 92: 567–578.

Rome, Q., F.J. Muller, A. Touret-Alby, et al. (2015). Caste differentiation and seasonal changes in *Vespa velutina* (Hym.: Vespidae) colonies in its introduced range. *Journal of Applied Entomology* 139: 771–782. **https://doi.org/10.1111/jen.12210**

Roy, H. (2023). BBC. Asian hornet guide. **https://www.discoverwildlife.com/animal-facts/insects-invertebrates/asian-hornets-guide/**

USDA-APHIS (2023). Yellow-legged Hornet. **https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/honey-bees/yellow-legged-hornet** (accessed 25 August, 2023).

Villemant C., M. Barbet-Massin, A. Perrard, et al. (2011). Predicting the invasion risk by the alien bee-hawking yellow-legged hornet *Vespa velutina nigrithorax* across Europe and other continents with niche models. *Biological Conservation* 144: 2142–50. **doi: 10.1016/j.biocon.2011.04.009**

BEEKEEPING INSURANCE SERVICES

APICULTURE INSURANCE PILOT PROGRAM

A Specialized Program for Beekeepers

Available Nationwide

We are Proud Members & Sponsors of:

- American Beekeeping Federation
- American Honey Producers Association
- California State Beekeepers Association
- Florida State Beekeepers Association
- Idaho Honey Industry Association
- Michigan Commercial Beekeepers Association
- Minnesota Honey Producers Association
- Montana State Beekeepers Association
- North Dakota Beekeepers Association
- South Dakota Beekeepers Association
- Tennessee State Beekeepers Association
- Texas Beekeepers Association
- Washington State Beekeepers Association
- Wisconsin Honey Producers Association, Inc.

Kevin Rader: Buzzus@beekeepingins.com

www.beekeepingins.com

Beekeeping Insurance Services A Division of Brown & Brown of Florida Inc.

A Closer LOOK

Instrumental Insemination

Clarence Collison

The natural mating behavior of honey bees presents a unique challenge to control. Queens are highly polyandrous and mate in flight with an average of 10 to 20 drones (Tarpy and Nielsen, 2002) at congregation areas consisting of 10,000 to 30,000 drones from diverse genetic sources (Koeniger, 1986). Instrumental or artificial insemination is an essential tool that provides complete control of honey bee mating for research and breeding purposes (Laidlaw, 1977 and Cobey et al., 2013).

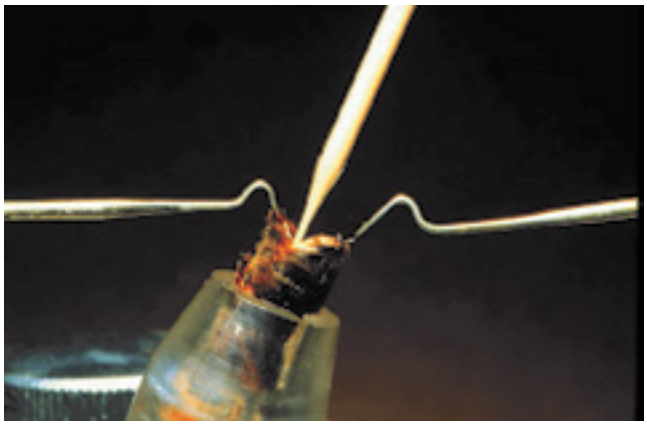
The ability to control mating has been one of the most challenging aspects of honey bee breeding. Attempts to mate honey bees in confinement date back to the 1700's and remain unsuccessful today. The technique of instrumental insemination, developed in 1920's and perfected in the 1940's and 1950's, provides a method of complete genetic control. Today, with improvements in instrumentation, the technique is highly repeatable and highly successful. Instrumental insemination also enables the creation of specific crosses that do not occur naturally, providing significant advantages to research and stock improvement. For example, a single drone can be mated to one or several queens, isolating and amplifying a specific trait. Varying degrees of inbreeding can be created to produce different relationships, including "selfing"; the mating of a queen to her own drones. Specific backcrosses can be created by extracting semen from the spermatheca of one queen to inseminate another (Harbo, 1986a). The ability to pool homogenized sperm cells from hundreds of drones and inseminate a portion to a queen or batch of queens enables unique mating system designs and simplifies stock maintenance. Within a closed population breeding system, the effective breeding population size, viability and fitness are increased using this technique (Page and Laidlaw, 1985). Another advantage of instrumental insemination is the ability to store and ship honey bee semen. Short term storage has been perfected (Collins, 2000b). The ability to ship semen, rather than live bees, minimizes the risk of spreading pests and diseases (Cobey, 2007).

Chuda-Mickiewicz et al. (2012) assessed the usefulness of CO_2/N_2 mixtures for anesthetizing queens in instrumental insemination. Of 98 instrumentally inseminated queens, 31 were anesthetized with 40% CO_2 and 60% N_2, 32 with 60% CO_2 and 40% N_2, and 33 with 100% CO_2. The gas composition did not affect the proportion of queens starting oviposition, which were: 85.3% for 40% CO_2 and 60% N_2; 87.9% for 60% CO_2 and 40% N_2; and 83.9% for 100% CO_2. On average, queens started oviposition significantly earlier in the treatments using 60% CO_2 and 40% N_2 (at 7.2 ± 4.0 days after insemination) and 100% CO_2 (at 8.1 ± 4.2 days) than those treated with 40% CO_2 and 60% N_2 (at 10.3 ± 4.1 days).

Carniolan sister queens at the age of seven days were inseminated with an 8µl dose of semen. Queens were anesthetized once during the insemination with different concentrations of carbon dioxide and air gas mixtures. It took queens a shorter time to be narcotized when CO_2 was given at higher concentrations. The timing was from 6.1 seconds when 100% CO_2 was used to 95.5 seconds when 50% CO_2 was used. Semen injection took longer in queens anesthetized with CO_2 at the lower 50% and 75% concentrations. The queens remained anesthetized significantly longer when higher CO_2 concentrations were used. Among 276 instrumentally inseminated queens, 88% started laying eggs before the end of the experiment and 12% did not start laying eggs or died before the end of the experiment. The highest percentage of queens that did not start laying eggs or died was noted in the group anesthetized with 75% and 80% of CO_2 (16.4% and 14.5%). In the other groups, the percentage of queens who did not start laying eggs or died ranged from 7.4% to 14.5%. Different CO_2 gas concentrations used for immobilization of bee queens during instrumental insemination significantly influenced oviposition of queens. Instrumentally inseminated bee queens began laying eggs four to 55 days after the insemination. The significantly shortest time from insemination to oviposition was noted in queens that were narcotized with 50, 100 and 90% of CO_2 (17.4, 17.6 and 19.9 days respectively). The longest time was noted in queens treated with 75-80% of CO_2 (after 22 days) (Bieńkowska et al., 2012).

The effect of the instrumental insemination of honey bee queens after they performed their orientation flight or attempted to perform the flight, on the number of sperm in the spermatheca was observed. Naturally mated queens and instrumentally inseminated queens were examined. Queens were instrumentally inseminated under one of the following four circumstances: the instrumentally

inseminated queens were seven days old and had been given either a short or long CO_2 treatment, or they were inseminated after the trial flight or after returning from the orientation flight. Queens from the various groups had a similar number of spermatozoa in their spermatheca (on average, from 4.7 to 5.3 million). The number of spermatozoa filling the spermatheca influenced both the color and the texture of spermathecae. Significant differences in the stored number of spermatozoa were found. Instrumentally inseminated queens that did not lay eggs had significantly less spermatozoa in their spermathecae (3.9 million) than egg laying queens (5.5 million) (Gerula et al., 2012).



Instrumental insemination, a reliable method to control honey bee mating, is an essential tool for research and stock improvement. A review of studies compare colony performance of instrumentally inseminated queens, (IIQs) and naturally mated queens, (NMQs). Factors affecting queen performance were also reviewed. The collective results of the data demonstrate that the different methodologies used in the treatment of queens, has a significant effect on performance rather than the insemination procedure. Beekeeping practices can optimize or inhibit performance. The competitive performance of IIQs is demonstrated when queens are given proper care. The advantage of selection and a known semen dosage can result in higher performance levels of IIQs (Cobey, 2007).

The addition of a saline solution to drone semen and the pre- and post-insemination care of honey bee queens affect both the number of sperm in the spermatheca and the condition of the oviducts. Queens were instrumentally inseminated and stored under various conditions. These conditions included being held in mailing cages with 15 or 25 workers in which all were kept at 20°C (68°F) or 34°C (93.2°F) and being held in nursery colonies in which the queens were caged without worker bees. Some of the queens in each group were inseminated with semen only, others were inseminated with semen and saline. The number of spermatozoa in the spermatheca did not significantly differ between the queens inseminated with semen only and those inseminated with semen and the saline solution. The queens kept in mailing cages with workers had significantly more spermatozoa than those queens banked in cages without worker bees. The addition of a saline solution to semen, and the conditions the queens were stored in, did not significantly affect the condition of the oviducts (Gabka and Cobey, 2018).

It is commonly believed that instrumentally inseminated honey bee queens initiate oviposition much later than naturally mated queens. A large-scale investigation was therefore conducted on 1,675 queens. Naturally mated queens initiated oviposition two to 23 (mean 6.8) days after the start of mating flights and the mode occurred 2.8 days earlier. Queens inseminated instrumentally with 8mm^3 of semen initiated oviposition three to 21 (mean 9.1) days after insemination and the mode occurred 3.1 days earlier. Thus, the mean and the mode of the onset of oviposition occurred only 2.3 or two days later in instrumentally inseminated queens than in naturally mated queens. Different treatments of instrumentally inseminated queens accelerated or delayed the onset of oviposition by only one day in relation to instrumentally inseminated queens not additionally treated (Woyke et al., 2008).

Mating causes dramatic changes in female insects at the behavioral, physiological and molecular level. The factors driving these changes (e.g. seminal proteins, seminal volume) and the molecular pathways by which these factors are operating have been characterized only in a handful of insect species. Niño et al. (2013) used instrumental insemination of honey bee queens to examine the role of the insemination substance and volume in triggering post-mating changes. They also examined differences in gene expression patterns in the fat bodies of queens with highly activated ovaries to determine if events during copulation can cause long-term changes in gene expression. They found that the instrumental insemination procedure alone caused cessation of mating flights and triggered ovary activation, with high-volume inseminated queens having the greatest ovary activation. Hierarchical clustering grouped queens primarily by insemination substance and then insemination volume, suggesting that while volume may trigger short-term physiological changes (i.e. ovary activation) substance plays a greater role in regulating long-term transcriptional changes. The results of gene ontology analysis and comparison with previous studies suggest that both insemination substance and volume trigger molecular post-mating changes by altering overlapping gene pathways involved in honey bee reproduction.

Queen honey bees were inseminated with 1.25µl of semen diluted with an equal amount of diluent: 0.9% physiological saline (NaCl) solution containing 0.1% sugar (glucose, fructose or trehalose or all three sugars) or the same sugars or sugar in buffered saline solution (pH 6.9). Unaltered semen, stirred semen and semen diluted with plain saline solution served as controls. The number of sperm reaching the spermatheca did not differ significantly among treatments. Also, when queens were held at 25, 30 or 35°C (77, 86, 95°F) or in the hive for two days after insemination with 2µl of semen, the number of sperm reaching the spermatheca did not differ but when the queens were held at 37.5 and 40°C (99.5 and 104°F), the numbers were significantly lower. The death rate of the queens was high at 40°C (Otto, 1969).

The effect of instrumental insemination and natural mating on selected and unselected characters in a breeding population was investigated. The experimental colonies were from a population that has been selected for three generations in terms of hygienic behavior. Honey yield, brood production and adult bee population characters were not taken into consideration as a selection criterion. Mother queens and drone fathers were selected from the breeding population. While a significant difference was found between naturally mated queen

(NMQC) and instrumentally inseminated queen colony (IIQC) groups in terms of hygiene behavior, there was no significant difference between the groups in terms of performance phenotypes. The average dead pupa removal was 84.44±0.87% in the NMQC; this average increased to 87.70±1.09% larvae/colony by the control of the father in IIQC usage. This result demonstrates that instrumental insemination can be used to produce colonies of equivalent phenotypes compared to open-mated queens (Güler et al., 2022).

Techniques to effectively store honey bee semen must meet some minimally acceptable level of spermatozoa survival. To determine this level, honey bee queens were instrumentally inseminated using various mixes of fresh and freeze-killed semen, and were allowed to lay eggs in small colonies for three weeks. The queens receiving all freeze-killed spermatozoa (0% fresh) had no spermatozoa in their spermathecae and produced only drone pupae (unfertilized eggs). The proportions of live and dead spermatozoa (determined by dual fluorescent staining) in the spermathecae of queens receiving 25 to 100% fresh semen were not significantly different at 27 days post-insemination. Queens receiving 50% fresh semen or more produced only worker pupae (all eggs were fertilized). Therefore, a program to improve storage of semen should only have to reach survival levels of 50% of the spermatozoa to have functional semen (Collins, 2000a).

Some studies have shown that naturally mated queens are superior to instrumentally inseminated queens. However, as the instrumentation has been improved and the methodology has been refined these differences are no longer as evident. Harbo and Szabo (1984) found that instrumentally inseminated (II) queens did not survive as long as naturally mated (NM) queens and that colonies with (II) queens produce less brood. Therefore, even if genetically superior colonies are produced using (II), this advantage can be quickly lost by early supersedure or reduced brood production. To take full advantage of controlled breeding, one must produce (II) queens that are not handicapped by the insemination process (Harbo, 1986b).

Harbo (1986b) proceeded to investigate and describe the differences between (II) and (NM) queens in more detail and search for causes of these differences. Egg laying rates of queen honey bees were measured in colonies containing their own brood and ca. 3,000 or 12,000 worker bees. Naturally mated queens were heavier and laid more eggs per day than instrumentally inseminated queens. CO_2 narcosis caused weight loss in queens and may account for at least some of the difference. When nitrogen narcosis replaced carbon dioxide during instrumental insemination, queen weights increased, but still did not equal those of naturally mated queens that receive no narcosis. The correlation between egg laying rate and queen weight was r = 0.73 (n=112).

References

Bieńkowska, M., B. Panasiuk, P. Wegrzynowicz and D. Gerula 2012. *Effect of different carbon dioxide gas concentrations used during the insemination of honey bee queens on starting oviposition.* J. Apic. Sci.56: 125-135.

Chuda-Mickiewicz, B., K. Czekońska, J. Samborski and P. Rostecki 2012. *Success rates for instrumental insemination of carbon dioxide and nitrogen anaesthetized honey bee (*Apis mellifera*) queens.* J. Apic. Res. 51: 74-77.

Cobey, S.W. 2007. *Comparison studies of instrumentally inseminated and naturally mated honey bee queens and factors affecting their performance.* Apidologie 38: 390-410.

Cobey, S.W., D.R. Tarpy and J. Woyke 2013. *Standard methods for instrumental insemination of* Apis mellifera *queens.* J. Apic. Res. 52: 1-18.

Collins, A.M. 2000a. *Relationship between semen quality and performance of instrumentally inseminated honey bee queens.* Apidologie 31: 421-429.

Collins, A.M. 2000b. *Survival of honey bee (Hymenoptera: Apidae) spermatozoa stored at above freezing temperatures.* J. Econ. Entomol. 93: 568-571.

Gabka, J. and S.W. Cobey 2018. *Factors, based on common practices, affecting the results of instrumental insemination of honey bee queens.* Apidologie 49: 773-780.

Gerula, D., B. Panasiuk, P. Węgrzynowicz and M. Bienkowska 2012. *Instrumental insemination of honey bee queens during flight activity predisposition period. 2. Number of spermatozoa in spermatheca.* J. Apic. Sci. 56:159-167.

Güler, A., H. Önder, G. Kavak, G. Toktay, E. Uğurlutepe, S. Biyik, and A. Aydin 2022. *The effects of instrumental insemination on selected and unselected breeding characteristics in honey bee (*Apis mellifera *L.).* Apidologie 53: 35.

Harbo, J.R. 1986a. P*ropagation and instrumental insemination,* In: Rinderer, T.E. (Ed.), Bee Breeding and Genetics, Academic Press, Inc., pp. 361-389.

Harbo, J.R. 1986b. *Oviposition rates of instrumentally inseminated and naturally mated queen honey bees (Hymenoptra: Apidae).* Ann. Entomol. Soc. Am. 79: 112-115.

Harbo, J.R. and T.I. Szabo 1984. *A comparison of instrumentally inseminated and naturally mated queens.* J. Apic. Res. 23: 31-36.

Koeniger, G. 1986. *Reproduction and mating behaviour,* In Rinderer, T. (Ed). Bee Genetics And Breeding, Academic Press, Inc. pp 255-275.

Laidlaw, H.H. Jr. 1977. *Instrumental Insemination Of Honey Bee Queens.* Dadant and Sons, Hamilton, IL.

Niño, E.L., D.R. Tarpy and C.M. Grozinger 2013. *Differential effects of insemination volume and substance on reproductive changes in honey bee queens (*Apis mellifera *L.).* Insect Mole. Biol. 22: 233-244.

Otto, M. 1969. *Effect of diluents and temperature on instrumental insemination of queen honey bees.* J. Econ. Entomol. 62: 1370-1372.

Page, R.E. and H.H. Laidlaw 1985. *Closed population honey bee breeding.* Bee Wld. 66: 63-72.

Tarpy, D.R. and D. Nielsen 2002. *Sampling error, effective paternity, and estimating the genetic structure of honey bee colonies (Hymenoptera: Apidae).* Ann. Entomol. Soc. Am. 95: 513-528.

Woyke, J., Z. Jasinski, J. Prabucki, J. Wilde, B. Chuda-Mickiewicz, M. Siuda, B. Madras-Majewska, J. Samborski, J. Bratkowski, and A. Jojczyk 2008. *Onset of oviposition by honey bee queens, mated either naturally or by various instrumental insemination methods, fits a lognormal distribution.* J. Apic. Res. And Bee Wld. 47: 1-9.

Clarence Collison is an Emeritus Professor of Entomology and Department Head Emeritus of Entomology and Plant Pathology at Mississippi State University, Mississippi State, MS.

American Honey Producers Association

Annual Conference & Trade Show

San Diego

December 4 - 7, 2023

Monday - Thursday

Marriott Mission Valley Hotel

For more information
visit www.ahpanet.com

BEE90X

The Next Evolution in Human Fitness Fads

Stephen Bishop

Pickleball is the fastest growing sport in the United States. From what I can tell, basically it's a combination between tennis and ping pong. Also, from what I can tell, no pickles are involved. Apparently, the guy who created it couldn't think of anything better to call it so he just named it after his dog, which he named after cucumbers embalmed in vinegar brine. As with any new activity that requires Americans to exert themselves physically, pickleball could be a fad.

Peloton, which promised an overpriced stationary bike with a built-in support system of duped people to commiserate with you, turned out to be a fad—who would have thought? But I'm not one to talk, I've had a Planet Fitness membership for five years, with a gym utilization rate of 2.3 workouts per half-decade. The gym membership is only $10 per month, so why bother canceling? No joke, this is the actual business strategy of Planet Fitness. The reason they don't raise their prices is because, if they did, people would actually find the willpower to cancel something they never use. As it stands now, they make a fortune from modern parents like me who are not only too exhausted to go to the gym to workout but too exhausted to go to the gym to cancel their membership. Requiring people to cancel in person was a stroke of business genius.

No discussion of fitness fads would be complete without mentioning CrossFit. I don't know much about CrossFit, except what I've seen while walking past the CrossFit here in Shelby. From what I can tell, it's basically a safe place where slightly unhinged people can run around in circles and play with blocks. In that regard, it resembles my toddler's daycare, except the unhinged people are mostly adults experiencing a midlife crisis, which means I'll probably be signing up for it soon.

But the point here is that people are suckers for fitness fads, and farmers are already capitalizing on this trend, hence the new fitness fad sweeping the nation, Goat Yoga. If anything, Goat Yoga is proof-of-concept for my newest beekeeping enterprise. If people are willing to fork over money to do the downward dog with goats climbing on their back, surely they'd pay good money to buy BEE90X, the next evolution of P90X (remember that fitness fad last decade?).

BEE90X consists of a series of grueling bee-related exercises to improve strength and cardiovascular fitness, like honey super deadlifts, swarm catching ladder climbs, and 100-yard sprints from guard bees. Each workout concludes with a relaxing swatting and flailing routine which is guaranteed to not only improve your hand-eye coordination but really work your core.

But don't take my word for it. Here's what some other *Bee Culture* writers had to say after testing my grueling new workout program.

"You should consult a doctor before starting any new workout routine. If you survive this program, you *will* have to consult a doctor afterwards." ~Jerry Hayes

"Doing exercises while inhaling smoke from a bee smoker is probably counterproductive; however, three sets of bee smoker bicep curls are sure to get both your biceps and lungs burning." ~Dr. James Tew

"These exercises are indeed grueling—watching Stephen Bishop do the waggle dance exercise is nearly impossible to watch." ~Ed Colby

To pre-order BEE90X, I've started a kickstarter campaign or you can wire $500 straight to my overseas account in the Cayman Islands. In fact, for *Bee Culture* readers, I'll throw in my patent-pending Portable Sweat Lodge for free, which is a bee suit lined with a premium heavy duty plastic trash bag. It's guaranteed to dehydrate you in ninety minutes or less. BC

Saving Ukraine's National Beekeeping Institute and Museum

John Gordon Sennett

Photo 1

June 26, 2023 was a quiet cool day in Kyiv, Ukraine. No Air Raid sirens woke us in the middle of the night. Just two nights before, missile debris had struck a building killing four people in the Solom'yanskyi District. The very district we used to live in and would have to travel through for our first ever visit to the Ukraine National Beekeeping Museum (Photo 1). My wife's (Natasha) maiden name is Prokopovych on her Ukrainian side. Petro Prokopovych (1775-1850) is widely recognized as the first ever designer of commercial beehives with his movable frame hive (see Photo 2). Natasha was excited even though the Soviets had destroyed most birth records and she has no idea if she is a direct relation of this famous Ukrainian beekeeper. I was excited because I had wanted to visit ever since we moved to Ukraine in November 2020 and then the war stopped all essence of normal living. We have merely learned to live with the war and today's outing was highly anticipated. Plus, we would be meeting our friends who are considering their own apiary in the south of Kyiv Oblast.

Our Uber driver professionally wove through traffic and soon enough we arrived at the gates. A worn sign identified the grounds of the museum as the "Prokopovych Institute of Beekeeping" (Photo A). Our friends were running behind and as we entered the gate, the guard informed us the museum was closed. My wife rattled off her fluent Russian and soon enough, a phone call was made, the gates opened. Once you step inside the gates, the urban environment completely disappears. We first encountered a single apitherapy house along with wood-carved gnomes the size of small logs. Meandering down the lane, an older woman was pulling weeds near the statue of Petro Prokopovych. Natasha spoke with her briefly and we continued on. Soon, we came upon all different styles of beehives from the old log hives to Ukrainian-style long hives to some Slovenian and others. All this on display in the outdoors. More whimsical log gnomes greeted us along the way (Photo 3).

Photo 2

Soon enough, we encountered a man who greeted us and asked us our business. We informed him we wanted to see the museum. He had to check higher up the ladder and told us to wander a bit while he did so. Further down the lane, we came across an Orthodox Christian chapel with various saints who were known as beekeepers. The inside was closed but the exterior was well adorned. We continued on, our friends informed us they were running late and stuck in Kyiv traffic. At the end of the lane, we came across several active Langstroth hives in a small beeyard. I could tell that two of the hives were strong but a third was weak based on the activity in and out of the hives. Soon enough, our guide was inquiring if our friends were coming and he was beginning to look impatient. A few moments later,

Photo A

we saw them making their way down the lane.

Our guide never gave us his name or maybe I missed it when he did. Once we were all together, he became very enthusiastic. Since my wife is a Russian speaker, he chose that language instead of Ukrainian. Our friends are also fluent in both languages and I get by a little in both. The first room we enter holds old farming instruments from the 1800's along with a loom to show the tradition of Cossack self-sufficiency. Petro Prokopovych came from a family of priests of Cossack origin. Various implements for shearing sheep and combing the wool lie around, an old horn instrument and several garments with the signature embroidery style of Ukraine.

Next, we enter a full room of preserved hives and other beekeeping instruments. Here, there is a perfectly preserved Prokopovych Hive (See Photo 2). There are old Slavic log hives on one side of the room. Ukrainian-style long hives in various forms, some painted with elaborate Cossack scenes and other hives from Poland, the Baltics and Slovakia line the walls. Our guide shows us queen nucs with wax still in the frames. Also, a very interesting box that I thought was a nuc box turned out to be an apitherapy box that a healer carried with them when using bee stings. A large painting of monks tending beehives adorns one wall of the whole room as well. We probably could have stayed there another hour but being the museum wasn't "officially" open, we didn't want to press our luck.

Our guide politely showed us into the next room where there sat a model of "The Swallow's Nest" which is a famous castle on the coast of Crimea, now occupied by the Russians. The most amazing thing is that our guide opened it to reveal that it was once a decorative, functioning beehive with customized movable frames.

Photo 3

Photo 4

Just off that room, stood one of the great treasures of the whole museum. A room full of products made from beekeeping. There were two whole cabinets of apothecary items from a century ago to modern times. An apitherapy inhaler sat lonely next to them. A full cabinet of various beekeeping tools from wax scrapers, framing implements, hive tools and other sundry items known to most beekeepers stood to the left. Three cabinets with various items made from beeswax from the practical to the artistic kept us all mesmerized for quite a while. There was even a copy of Da Vinci's "Last Supper" cast entirely of beeswax. My friend Kostya and I were intrigued most by the last cabinet. It contained a complete collection of various alcoholic spirits made from not only honey but propolis and a bottle of sake said to be made from the remains of dead bees. We didn't want to leave this room and there was hardly enough time to examine every single item.

Our guide got very excited as he led us into the last room. The electricity flickered on and off as it often does in the war. He was downcast and we all stood there for a minute discussing some of the displays we had seen. A whir in the background and the lights came on and our guide smiled as he lit a full diorama of the Kyiv Pechersk Lavra (Photo 4). This monastery is the most famous in Kyiv because it is the foundation of Orthodox Christianity in most of the Northern Slavic lands founded in 1051. In 2013, the International Beekeeping Congress (Apimondia) was held in Kyiv and a tour of the

HEAVY METAL

High-Quality Stainless Steel Extractors

Dadant manufactured extractors are built with gauges of steel heavier than our competitors.

Dadant extractors are crafted by skilled metal workers at our manufacturing facility in Dallas City, IL.

With a recent overhaul to the legs on each unit and redesigned inner reels, Dadant extractors are more durable and reliable than ever before.

Available in a variety of sizes, we are sure to have the perfect extractor for your honey operation.

Shop with us online at dadant.com

Are you looking for an upgrade?
Contact us today and let Dadant help.

Dadant **Online** dadant.com | **Toll-Free** 888.922.1293

monastery's apiary was part of the program. Orthodox monks produce honey, beeswax candles and other products to this day. Now, during the war, the Kyiv Pechersk Lavra is another battleground for Moscow's control of Ukraine. Yet, the monastic beekeepers, we assume, still look after the apiary.

Just as we were about to wrap up our tour, another man entered and introduced himself as a Director of the Museum, Genadiy Bodnarchuk. He explained the entire complex and museum were found by his father, L.I. Bodnarchuk (1938-2015) and the museum itself is now named the L.I. Bodnarchuk Beekeeping Museum. We had a good laugh when he told us he is allergic to bees (a trait we share in common). Our friend who wanted to start an apiary had some questions and Gendaiy gladly spoke to them about the two different types of *Apis mellifera* used for beekeeping in Ukraine. There is what he called the "Steppe Bees" which are more adapted to warmer climates and live in the south of the country. Unfortunately, this is where most of the active war zone is and many beekeepers have lost their apiaries through death, destruction and theft by the invading army. The other type of honey bee used he called "Carpathian Bees" which he got very excited about. Apparently, these are very disease/pest resistant, gentle and he became animated as he explained that they forage in fairly cold temperatures compared to many others.

Genadiy is a very kind man who exudes a love for what he does but he couldn't avoid being downcast as he explained that due to the war, almost all their funding has dried up. He barely scratched enough money together to fix a roof that collapsed during the Winter, nearly destroying some of the museum's displays and archives. Officially, they could not generate revenue from visitors because there is no bomb shelter on the grounds so they cannot legally be open to the public. Genadiy still maintained a twinkle in his eye and a glimmer of hope like we all do who have endured this war so far. All of us chatted for nearly an hour as he showed us some experimental hives that they were also seeking funding for. Genadiy smiled as he told us that the Apimondia Congress had said that their museum "Featured a collection that no other museum in the world comes close to." (**https://www.apimondia2013.com.ua/technical-tours**).

Those events are long gone now and maybe they have all been forgotten. The free hosting of the museum's website is long since expired. Grass and shrubs are overgrown in many areas of the grounds. No visitors can come. Many beekeepers throughout Ukraine have been killed as soldiers as well as being hit by Russian missiles and artillery. A picture of a Langstorth hive painted in the blue and yellow of the Ukrainian flag, floating in water from the detonation of the Nova Kakhovka Dam and its resulting floodwaters as the honey bees so desperately clung as a swarm on the outside still haunts me. The story from a Ukrainian Telegram Channel (**https://t.me/pravdaGerashchenko_en/27050**) of a sixty-eight year old beekeeper named Serhiy (Photo 5 by Alexandr Chekmenev) who managed to grab some honeycombs before running into an underground shelter with nine children and nine adults who made candles from the beeswax to provide light for the scared children. Seven of the adults were executed by the Russians and ten others died due to the conditions in the cellar. Serhiy survived but only two out of his forty-two hives survived. The longing and pain of the photo of a beekeeper who lost so much still circulates among all the other horrors of this war.

Photo 5 (Art by Alexandr Chekmenev)

Natasha (now a U.S. citizen) always speaks fondly of her years in the U.S. and how she loves the kindness and generosity of Americans. We drove away and decided that despite being busy, dealing with our own war issues, that maybe we should start a Facebook page for the Petro Prokopovych National Beekeeping Museum. Here is this treasure of Ukraine and of international beekeeping history that may be lost or fall into serious disrepair because of the actions of a murderous enemy that is trying to destroy Ukrainian history, culture and people. According to some sources, Ukraine is the top honey producer in Europe and in the top five countries worldwide. Yet, there is no mechanism beyond this small operation to conduct experiments, catalogue beekeepers, pests, diseases and promote beekeeping in Ukraine. Here, in the place where the first commercial beehive was invented, there is little hope among the staff that anyone will help. The value alone for beekeepers in North America related to the Carpathian and Steppes variant bees is enough for someone to come to the rescue. Then, I thought, well, maybe if people there actually knew the story, those values that Natasha cherishes so much would immediately come into play. BC

Author Bio

John Gordon Sennett is a U.S. citizen living in Ukraine since November 2020 with his wife Natasha (Prokopvych). Natasha's family in Ukraine has a long history of beekeeping. She bought John a hive for his 50th birthday and he was hooked. John was an urban hobbyist beekeeper in Lakeland, Florida for four years where he was an active member of the Ridge Beekeeper's Association in Polk County and kept three modified Langstroth Long Hives with feral bees.

INTRODUCING

Paradise Queen Hawaii

Your source for Varroa resistant genetics

ADMITTING THE PROBLEM

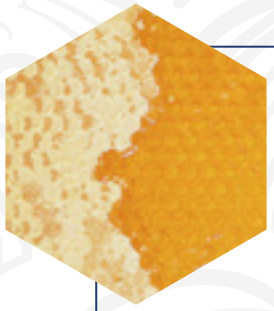
You don't have to be a scientist to know that Varroa mites are wreaking havoc on the nation's honey bees. Commercially available mite treatments are becoming less effective with each passing year. We believe Varroa Sensitive Hygienics (VSH) are part of the answer.

VSH IS NOT A DIRTY WORD

It isn't a magical fix but it *is* an effective first line of defense. The ability for honey bees to detect Varroa mites in sealed brood and uncap the infested cells disrupts the mite's reproductive cycle so the hives can help you help them. This significantly reduces the need for chemical treatments to combat Varroa mites.

BREEDING A SOLUTION

Our journey began as *Hawaii Island Honey Company*, key cooperators in a breeding program to further develop and enhance the VSH trait. A company lab was built near Hilo, Hawaii to take our VSH breeding to the next level. The project originated with the USDA Bee Lab in Baton Rouge and later, VSH Pol-line was incorporated into the program.



NEW NAME, SAME GAME

Now under the same ownership as Kona Queen Hawaii, our mission continues in isolated breeding yards on the Hilo side of the Big Island. The Paradise Queen team is hard at work selecting the most productive colonies and steadily improving issues that have kept many away from VSH queens in the past.

PARADISE IS VARROA UNDER CONTROL

While we may never fully get away from chemical mite treatments, reducing the industry's reliance on these products is a crucial step in the right direction. Our VSH genetics can help you take back the power in the fight against Varroa mites.

PARADISE QUEEN HAWAII

CALL NOW FOR PARADISE QUEEN AVAILABILITY

808-328-9016 | info@paradisequeenhawaii.com | www.paradisequeenhawaii.com

Minding Your Bees And Cues

Is vaccinating bees in our future?

Becky Masterman & Bridget Mendel

Feeling nostalgic for the days when the word "vaccination" was ubiquitous in casual conversation, we decided to explore honey bee vaccinations by interviewing Annette Kleiser, Ph.D., CEO for the biotech company Dalan Animal Health, which has been granted a conditional license by the USDA for their honey bee vaccine.

If you thought creating a vaccination for a regular body was complicated, try making one for a superorganism! In the case of the vaccine Dalan is developing, every mated adult queen would need to be vaccinated. And right now, they are just working on American Foulbrood (AFB), which, while an outbreak can devastate, remains a less-common concern than other diseases like European Foulbrood (EFB), deformed wing virus, chalkbrood and others. How many beekeepers would think it worth preventively vaccinating against this awful but less common disease, especially if they requeen – and would therefore need to revaccinate – yearly?

We reached out to Annette to find out more. And she assured us that they were truly in the proof-of-concept phase, with the primary goal of garnering support and interest in the beekeeping world. But we had to wonder, why start with a disease so virulent that challenging bees with it to see if the vaccine worked would be… problematic?

Beekeepers are used to industry pressing technology on them, and most of us have developed a somewhat skeptical stance towards the myriad of supplements, gadgets, and flow hives that are foisted upon us, so we brought that attitude to Annette right away. What was her investment in the beekeeping industry?

First of all, we thought Annette was very cool. She is a biologist by training, then moved to helping researchers to develop products and take their work beyond publications. Annette had done her homework and shared a sentiment that spoke to us: "Honey bees… play a vital role in our food security, mitigating climate concerns and supporting biodiversity. ⅓ of our foods depend on pollination, and honey and other products are critical in our food and pharma industries. Despite this fact, beekeeping has been overlooked too long by traditional animal health to provide modern tools for disease prevention and management. Dalan's goal is to change this."

We were on board with their goal of finding solutions to bee diseases that don't rely on antibiotics or equipment-fed bonfires. As you'll see in the Q&A, Dalan, like beekeepers, doesn't believe in silver bullets and instead sees their vaccine as a tool in the larger toolkit of good management, good hygiene, good genetics and good nutrition. After we share her answers to our nosy questions, we will end with some further thoughts and questions that were left pondering…

Q: Talk about honey bee immune response and how it relates to the vaccine.

A: Transgenerational immune priming (TGIP) is a natural process whereby maternal insects protect the next generation of offspring from diseases. Nurse bees will encounter a pathogen in the hive, by let's say cleaning out larvae that have come down with AFB. The nurse bee will take up some of the bacteria that cause the disease, and some bacteria may end up in the royal jelly that is fed to the queen. When that happens, pieces of the dead bug will end up in the ovaries and stimulate an immune response in the developing larvae making them more resistant to infection once they hatch. Our vaccine builds on this natural process. During the vaccination process, we expose the nurse bees and the queen in a very controlled way to a high dose of dead bacteria to ensure that the correct amount is transported to the eggs.

Q: Currently beekeepers are warned about potential AFB transmission from used equipment or feeding their bees honey from unknown sources. Do you see this vaccine as a game changer for the need of those practices?

A: AFB is so problematic because spores can live in the

Figure 1. The field diagnostic test for AFB is to measure the ropiness of the diseased brood. Photo credit: Heather Chapman

environment for decades, but other bacteria and diseases can be contracted from the use of honey and other sources. I think caution and good hygienic practices should always be part of the routine to keep colonies safe. However, we see this vaccine as a critical part of an integrated control program for sustainable beekeeping that for too long has relied solely on antibiotics to fend off bacterial diseases.

Q: Hygienic behavior has been helpful to remove AFB infected brood from the colony nest prior to it becoming infectious. Has anybody investigated or discussed the potential efficacy of the vaccine and hygienic behavior in protecting bees from AFB?

A: Honey bees are often called a superorganism where the colony has mechanisms for dealing with diseases and infection on an individual level, and on a colony level. Individually bees neutralize disease-causing agents, through a variety of mechanisms like the cutis, grooming, saliva, antimicrobial peptides and other components of the bee immune system. On the colony level, the disease is eliminated though hygienic behavior, removing sick larvae, food sterilization, propolis, but also increasing the colony temperature and creating a fever or sharing antimicrobial peptides with each other. Our vaccine has to be seen in this context. Vaccination is supercharging TGIP and will be supported by all other superorganism mechanisms of disease prevention. Dalan is currently conducting a multi-year, large scale pilot field trial to study the effect of vaccination in the field, where all is coming together.

Q: Does the current research support the possibility that one vaccine might be able to protect bees from multiple pathogens?

A: Our researchers started looking into this for bacterial brood diseases. We have encouraging early results but that is as much as I can say at this time.

Q: The idea of a bee vaccine is exciting, but beekeepers know to be suspect of things that look like silver bullets. What warnings do you have about the capacities and efficacy of this vaccine?

A: I don't think there is such a thing as a silver bullet. We still need to provide skilled care for these precious animals. Our vaccine was tested and licensed for one disease. It is the first step towards a new era of disease prevention in honey bees. One day we want these tools to become part of the routine measures to protect honey bees, just like taking our pets to the vet to make sure they are protected and kept safe and ensure that they don't spread diseases to others.

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

Q: Are there common misconceptions you would like to address?

A: One of the most common misconceptions is around efficacy. When we develop animal vaccines, and in particular, when working with highly contagious diseases, we had to conduct lab efficacy tests rather than infecting animals in the field. That requires establishing laboratory models that use an extremely high infection pressure forcing a high number of animals to die. This is important to arrive at a statistically significant efficacy result. We infect larvae with 5,000-10,000 spores, while typically less than 200 spores are sufficient to kill larvae in a hive. However, we achieved up to 50% survival in these extreme situations in the lab. If you now think of the field situation where you have a much lower infection pressure in the early stages, plus you add in the superorganism ability for disease mitigation, the assumption is that efficacy of the vaccine to protect from disease will be a lot higher.

Q: The Dalan pipeline has AFB, EFB and chalkbrood. Are the viruses transmitted by *V. destructor* on your radar?

A: Yes, viruses are very important and tools to protect from them need to be a key part of mite management. Viral vaccines are more difficult to manufacture but now that we know how to develop bee vaccines in general, we are ready to tackle viruses as well.

Q: What else do you want to share with us?

A: We realize that our product is just the start. We must be mindful that modern agriculture must also act responsibly in the use of insecticides and herbicides, and that we are at a tipping point. Our product has to be a part of a concerted/integrated effort to provide bees the best possible environment for them to do their job. This may require not only voluntary reductions in some of the damaging chemical practices, but also potential legislation.

Concluding thoughts:

We felt that Dalan's desire to gather feedback from experts – beekeepers – was sincere: because vaccinating individual bees seems time consuming, the product would need to be excellent enough to actually save the beekeeper money and labor towards honey bee disease management.

While efficient and effective vaccination still seems a long way off after this interview, we like the mindset that we need to prevent disease as much for our bees as for our neighbor's bees. If *varroa* and their virus complex has taught us anything, it is the imperative for this community-minded approach. We like Dalan Animal Health's investment in the vaccine technology, though beekeeper investment is also needed to move this solution forward. Meanwhile, we can dream of a double disease vaccination that protects against the less common AFB and currently too common and menacing EFB. We would give it a shot! BC

Resources

Dalan Animal Health
https://www.dalan.com/

About American and European Foulbrood
https://bee-health.extension.org/american-and-european-foulbrood/

Dadant

Beekeeping & Honey Bees - Our Business Since 1863

FREE SHIPPING on purchases of $150 or more. Some items do not apply.

www.dadant.com

51 S. SECOND STREET, HAMILTON IL 62341 • PHONE (217) 847-3324 • FAX (217) 847-3660 • TOLL FREE 1-888-922-1293
• CHICO, CA (877) 332-3268 • FRESNO, CA (877) 432-3268 • PARIS, TX (877) 632-3268 • SIOUX CITY, IA (877) 732-3268 •
• WATERTOWN, WI (877) 232-3268 • ALBION, MI (877) 932-3268 • WILLIAMSPORT, PA (877) 532-3268 •
• CHATHAM, VA (800) 220-8325 • FRANKFORT, KY (888) 932-3268 • HIGH SPRINGS, FL (877) 832-3268 •

CERTAN IS BACK

B402 / Certan

is the most advanced, effective and economical product for the protection of your combs from damage by wax moth

Concentrated solution of *Bacillus thuringiensis*

Proudly made in the USA

Completely harmless to humans and honey bees

B402®

Environmentally friendly

Efficacy of up to 100% against wax moth larvae

Leaves no residues in wax or honey

Only one application needed for complete protection

beehealth NORTH AMERICA

Vita Bee Health is a trading name of Vita (Europe) Ltd.

www vitabeehealth.com VitaBeeHealthNorthAmerica VitaBeeHealth info@vita-europe.com

From the University of Florida Honey

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

This year we have been trying to give readers a closer look at what we do at the University of Florida Honey Bee Research and Extension Laboratory (UF HBREL). We've already introduced our research, teaching and extension programs. You've seen the pictures of our amazing facilities and peeked behind the curtain to learn what it takes to keep a laboratory running. What I want to do now is show you how we prioritize the professional development of our volunteers and employees here at HBREL.

If you take the time to read them, basically all university mission statements say that they are dedicated to developing their students to go forth to lead and shape a better society. Essentially, universities exist to educate students, so they can gain knowledge or training in a particular area that allows them to go forth and succeed in their chosen career. Can you see how the university system is different from other businesses in regard to our training mission? Our job is to develop people with the kinds of skill sets that we find desirable and then push them out into the world. In almost every other situation I can think of, businesses train their employees because they want to *retain* skilled employees! While employee turnover exists everywhere, university systems are essentially designed for continuous turnover. This presents a unique challenge which we are constantly facing at HBREL. We are always training and developing our lab members to leave us to go change the world.

Anybody that has worked as a manager in some capacity knows that it takes a lot of purposeful thought, planning and effort to train employees. You might get frustrated that people do not follow directions well enough, or you think, "I could just do this myself in a fraction of the time it takes this person to do the same task!" No doubt it is one of the most challenging parts of leadership. I became a scientist because I loved conducting research and exploring the unknown. I imagined that I was going to spend every day in the lab or in the field, secluded and pondering the mysteries of the universe. Turns out, most of my role as a scientist and a lab leader is managing people. And guess what? To my great surprise, I love it! The satisfaction I get by sending an interesting scientific finding into the world pales in comparison to sending out a well-trained, capable scientist or extension specialist into the world. I think most of us could agree that the world needs more well-trained researchers and communicators of science. This is why the leaders of HBREL take mentoring and developing our lab members as a major priority of our professions.

We take the development of our volunteers and employees so seriously, in fact, Jamie Ellis, Amy Vu and I are always looking for new ways to make us better mentors and leaders. The three of us have made a goal to get some kind of training each year that makes us better leaders in some way. Last year, I completed a semester-long Mentorship Academy offered by the College of Agricultural and Life Sciences (CALS) at UF. Over the semester, I was part of a cohort of about 20 CALS faculty that was trained in areas like effective communication, aligning expectations and promoting professional development, as well as many other topics. Recently, Amy and Jamie were invited to participate in a leadership training that is notorious for being incredibly valuable and desired. A lengthy application process and letters of recommendation are required just to apply for these programs and very few are selected. During these trainings, they learned from experts how to develop personal leadership and how to effectively mentor others.

We have so many different types of members in our lab, each with their own needs, desires and responsibilities. Let me now share with you how we actively mentor and develop each member of our HBREL Team.

Developing our HBREL Staff

Our staff are essential to the functioning of our lab. Simply put, the staff's job is to make sure everyone else can do their job efficiently and effectively, whether it involves research, teaching or extension. They are the oil that keeps the machine running smoothly. Although their work is often behind the scenes, we want to ensure that no one becomes complacent in their position, floating along doing the same thing day in and day out. Everyone has dreams, hopes and desires. We want to help them reach those goals and grow professionally, honing their skills to be the best version of themselves possible.

The primary way we check-in and evaluate our staff members is through a UF document called UF Engage. The UF Engage program is very basic in nature. These simple evaluation sheets provide us a forum for discussing with staff members their skills and weaknesses, achievements and shortcomings. While correction and encouragement are occasionally necessary, most of our discussion is focused on identifying the staff member's goals and creating a plan to help them accomplish their desired professional achievements.

Bee Research and Extension Laboratory

Professional Development and Mentoring within the UF HBREL

Cameron Jack

Figure 1. Many members of the Honey Bee Research and Extension Laboratory attending the annual American Beekeepers Federation meeting in Jacksonville, Florida, USA in January 2023. From left to right, participants are Marley Iredale (graduate student), Serra Sowers (undergraduate student), Amy Vu (faculty), Jamie Ellis (faculty), Chris Oster (staff), Cameron Jack (faculty), Louis Dennin (staff), Jose Marcelino (post-doc), Steven Keith (staff), Jennifer Standley (graduate student) and Kaylin Kleckner (graduate student).

Sometimes we make plans with our staff members to attend seminars or national conferences (Figure 1). At other times we identify online courses or club meetings in which they can participate. Regardless of the activities, the focus is on ensuring that our staff members are happy, productive and fulfilled in their jobs.

Developing our Undergraduate Students

The University of Florida has a student population of around 55,000 bright undergraduates. Considering that about 1% of these students will take a beekeeping course each year, we have a lot of undergraduates coming through our doors one way or another. Now, everyone reading this article has already experienced the draw that follows once the beekeeping hooks set in, dragging us down this road of endless curiosity and wonder. Well, hundreds of undergraduates are experiencing this each year too, eventually bringing them to HBREL. In 2022, we had over 40 different undergraduate students work, intern or volunteer in our lab. So, what is our mission with all these students? It's to train them!

Undergraduates that catch the beekeeping fever often come to us asking if they can get involved somehow, but they typically have no clue what they can or cannot do. After some initial discussions, we determine what aspects of science or beekeeping the students are most passionate about and what career they would like to have in the future. You might be surprised to learn that about half of the students that come to volunteer in our lab go on to medical school or some kind of other health field. For many of these students, gaining research experience might suit them best, so they understand the intricacies of experimental design to help conduct future clinical research. Some of these future health professionals are interested in learning how to communicate effectively and decide to work with Amy's team of extension specialists. There are truly countless ways that undergraduate students can get involved to gain experience with us at HBREL, so I will only explain a few.

Many undergraduate students simply want to learn beekeeping, as it is a fun way to escape the pressures of assignments and midterms. Initially, they begin by shadowing some of our employed research technicians or lab beekeepers in the field to gain some exposure to the work involved. After a few weeks of practice, we might assign some of our undergraduate students to begin managing a small subset of our colonies in our on-campus apiary, so help is never too far away when questions arise. We especially rely on our undergraduate volunteers during our busy seasons when we need help feeding or conducting swarm management practices. As for students interested in communication, Amy frequently recruits these undergraduates to help her with our social media account management as well as to assist with editing and production of the Two Bees in a Podcast program. For students with a knack for writing, Amy can always find work for undergraduates editing our many different blog posts or updating extension documents. Students interested in extension also help us often with events such as Bee College, gaining program planning and teaching experiences. Additionally, there are many students who come to me specifically to gain teaching experience. As I explained back in the February 2023 issue of *Bee Culture*, we teach nine courses at UF related to honey bees and beekeeping. It would be impossible for me to teach that many on my own unless I had some help. Undergraduates that are interested in becoming educators themselves or are simply looking for ways to pad their resumés are often interested in working or volunteering as Teaching Assistants (TAs) in these courses. My TAs go through an application process and first need to demonstrate that they know their stuff, having completed previous bee classes with flying colors. After a bit of training at the beginning of the semester, the student TAs will be teaching hands-on lessons,

grading reports and answering other student questions through emails or office hours.

The majority of undergraduates that come to us at HBREL are interested in research. Unless they are simply here to gain a little experience before medical school, we are going to treat them as if they are preparing for graduate school. Depending on their level of experience, we might help them design their own experiment or ask them to help us with a part of an existing research project. Typically, we want to have students assist us with a current research project for several months first before having them design their own experiment, so they know more about the rigors of conducting publishable research. Additionally, we will mentor the motivated students to submit competitive applications for funding from the university, so they can gain grant writing experience as well. These grants are competitive, but UF will offer multiple grants worth $500-$2,000 each year for undergraduate researchers to fund their own work. Once the "Go Button" has been effectively pushed on an undergraduate research project, we hold bi-weekly meetings with that student to make sure that things are progressing well, and they have all the materials, supplies and support needed to complete their project. Once a project is completed and the data collected, we then work with the student on the analysis of the data. Depending on the complexities of the project, we can either recruit a graduate student or post-doctoral researcher to help teach the student the methods and procedures of appropriate statistical analyses. Once we have the results of the project, now the real fun begins.

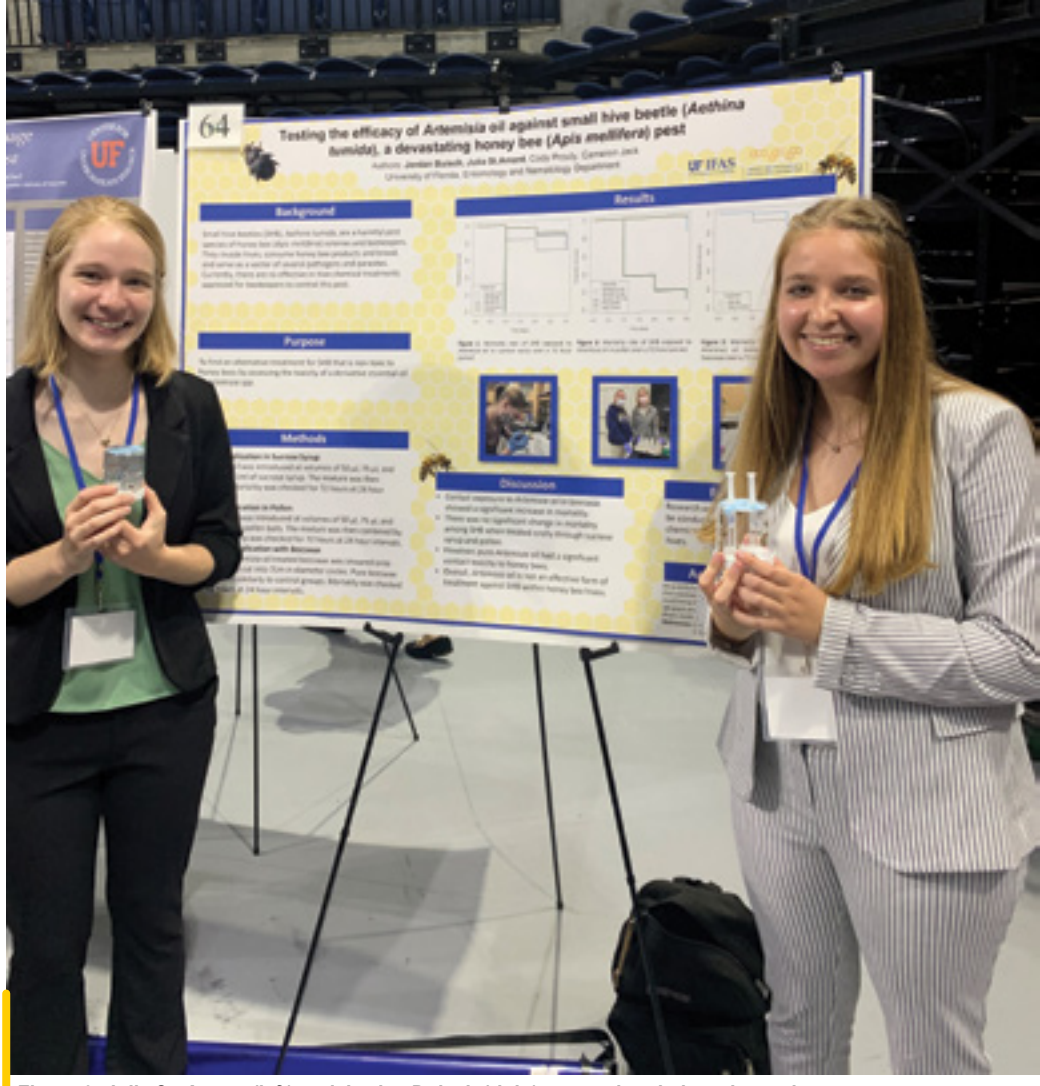
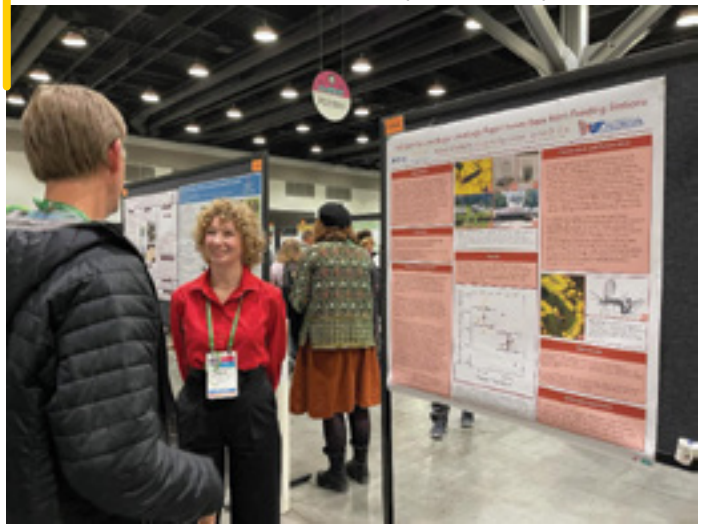


Figure 2. Julia St. Amant (left) and Jordan Buisch (right) presenting their undergraduate research at the University of Florida Undergraduate Research Symposium in Gainesville, Florida, USA during the Spring 2022 semester. Photo: Cameron Jack, University of Florida

We want to prepare our undergraduate researchers for graduate school by giving them opportunities to present and publish their work. Typically at the end of the semester, students will first present their work in the form of a 10-minute oral presentation or as a poster to the lab members during one of our weekly coordination meetings. After the student receives feedback from our lab members, we look for places for the undergraduate researcher to present their work either at a university, regional or national scientific meeting. Each year we will have several students presenting at the UF Center for Undergraduate Research's annual conference (Figure 2). Occasionally, when undergraduate students are able to obtain a student travel grant from the college or department, we will help send them to present at a larger national scientific meeting such as the Entomological Society of America meeting (Figure 3). The final, and possibly most difficult step in working with undergraduate researchers, is to write up these experiments and publish them in peer reviewed scientific journals. The reason that this step can be so difficult is because many students graduate before this crucial step is completed. However, undergraduate students who have successfully obtained their own funding, conducted research, collected and analyzed data, presented and published their own research have essentially completed all the necessary steps of being a scientist. These students never have any

Figure 3. Kathryn Naherny presenting her undergraduate research at the national Entomological Society of America meeting in Vancouver, British Columbia, Canada (Nov. 2022). Photo: Amy Vu, University of Florida



trouble finding graduate opportunities, as professors like me are lining up to recruit these top-level student researchers for graduate school.

Developing our Graduate Students

The processes and methods I just described for undergraduate students are really the same procedures used to mentor our graduate students, only the stakes are a little higher. While the mentoring of undergraduate students is enjoyable and rewarding, it is completely optional for most research institutions. On the other hand, the mentorship of graduate students is part of my university employment contract. I cannot progress in my career as a professor or keep my job for long if I do not effectively train graduate students. In fact, at a recent promotion workshop I attended earlier this Spring, my Dean of Research said, "Don't bother submitting a promotion packet with out having graduated multiple graduate students." Thus, you can see the weight of importance that higher-level research institutions like UF put on graduate education.

Once a professor agrees to take on a graduate student into their lab, they are expected to set the conditions and expectations for that student right away. There is a formal contract that is drawn up with the university regarding the terms of employment, but regarding policies and procedures of the lab, that is left up to the professor. I have found that a mentoring compact has been an incredibly helpful tool. This is not a legally binding document but is an agreement that both the student and advisor draw up together and approve. My mentoring compacts typically start by discussing our assumptions we each hold about each other, our roles and expectations for the mentoring relationship. My list of expectations for students include items such as having professional relationships with me and other lab members, being a team player, taking ownership of their educational experience and developing strong research and teaching skills. I also lay out in the mentoring compact what the students can expect from me. Specifically, I state that I will work diligently to help them throughout their degree program, that I will strive to lead by example, that I will provide opportunities to travel to conferences to present their research, that I will be their advocate in resolving issues, and finally, that I will continue to develop myself professionally to be a better mentor. I conclude my mentorship compact by explaining the process of evaluations.

There are two ways that graduate student development is regularly evaluated. One is through semesterly evaluations and the other is through Individual Development Plans (IDP) conducted annually. The semesterly evaluations are very simple and straightforward. It is basically a list of accomplishments that students were expected to complete over the three to four month semester. We'll review together how the student did overall and what they still need to complete. The IDP, however, is really more about mentoring and helping students develop the skills and traits that they desire professionally. The student will self-evaluate their strengths and weaknesses and will plan for how they will improve in their deficient areas. My primary role as a mentor in these cases is to encourage our graduate students and provide opportunities for growth.

I have found that the secret ingredient to successful graduate student mentorship is truly the most valuable thing a professor can give to anyone, time. To make time for my students, I carve out one hour each week on my calendar that I hold sacred for meeting with my students individually. During these weekly meetings we discuss recent progress on their projects, teaching or any other challenges they are currently facing. However, at a larger HBREL level, we also make time to meet weekly with graduate students and post-doctoral researchers for mentorship. Each week we have an informal science-breakfast meeting where we meet at a local restaurant before normal working hours to just talk science (Figure 4). Sometimes, we talk about current events in the world of research, other times we talk about strategies for improvement. However, the vast majority of our conversations are about our own projects. Before we start a new research project, we think through the research question, hypotheses and experimental design together. After the project has started, we discuss the best way to analyze the data, interpret the findings and how best to communicate the research with other scientists and beekeepers. I found that these meetings are incredibly valuable for graduate student development because this is where non-judgmental, open dialogues about research and our scientific understanding happen. I have grown so fond of these meetings that I consider it almost unnatural to think through a research project without simultaneously eating a plate of biscuits and gravy!

One important area of graduate student development is encouraging them to develop

Figure 4. The Honey Bee Research and Extension Laboratory together at a restaurant. Photo: Amy Vu, University of Florida

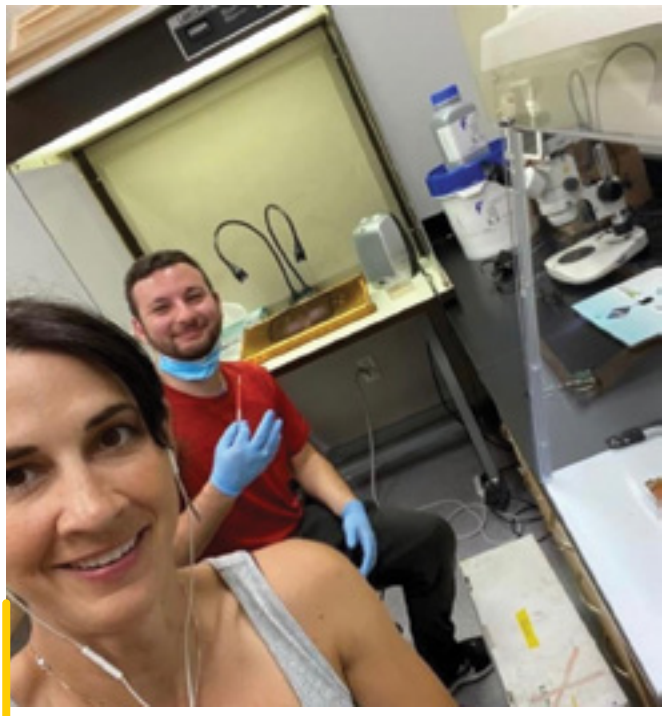


Figure 5. Jennifer Standley (graduate student) and Brett Labella (undergraduate student) grafting larvae for Jennifer's in vitro *reared honey bee larvae research. Photo: Jennifer Standley, University of Florida*

their own mentoring abilities. I frequently tell my graduate students that one of the most crucial skills to learn during graduate school is how to manage others, as this is what I've discovered is the primary job of a faculty member. As graduate students have responsibilities in the lab, field and the classroom, they typically need the help of others to complete their research. Luckily, we rarely have a shortage of undergraduate student volunteers in HBREL, so we encourage our graduate students to select the most capable of these undergraduates to include them in their projects (Figure 5). These undergraduate to graduate student relationships have often been incredibly rewarding and beneficial to both groups. Additionally, a lot of graduate to graduate student mentoring takes place. Sometimes, having your advisor point out an area of improvement is just not as impactful as one of your peers. One way we encourage graduate students to mentor each other is to encourage them to form writing groups. Students will usually rotate between writing and editing responsibilities. Typically, one week a couple students will write a few paragraphs of their research and submit it to two other editors. Each week, they take turns passing the writing and editing back and forth. This helps them develop critical writing skills while also giving them a chance to mentor one another. Of course, as advisors, we're thrilled to have our students working together to help improve one another. Plus, we love that they are simultaneously getting some important work done as well!

Developing Post-Doctoral Researchers

Many of you might not be familiar with the academic position of post-doctoral researchers. After completing one's Ph.D., a post-doctoral researcher, or post-doc for short, is typically an intermediate position before taking a permanent job at an academic institution or company. They are usually hired by specific grant funding for one or two years to complete work on a single project. While post-docs are working on the project they were hired to complete, they are also focused on gaining new skills and publishing research articles to make themselves more employable. Just like with graduate students, we similarly seek to mentor our post-docs to make sure that they are gaining the skills they want for future employment. While we are not required by the university to complete semesterly evaluations of our post-docs, we often follow a similar mentoring structure with post-docs as we do with our students.

In addition to improving their research skills, we always encourage our post-docs to improve other skills that can only be gained during their time at HBREL. There are no better teachers of honey bee/beekeeping extension than Jamie and Amy, so our post-docs are able to get a crash course in extension work and are given ample opportunities to participate in events like Bee College. Additionally, when beekeeping clubs and organizations reach out to us for speakers, we regularly send our post-docs as often as they are able, so they can have these important opportunities to work with the public. Along with extension, I offer post-docs opportunities to improve their teaching skills, if they have interest in pursuing employment at a university someday. For instance, I have co-taught my Insect Research – Honey Bee Health Research course with many post-docs through the years and it has always been a positive experience and solid resumé builder for them.

An important skill in any future profession is the ability to work well with others. A crucial way to develop and demonstrate teamwork skills is through mentoring, so most post-docs are extremely eager to do this. Just as with graduate students, we frequently encourage our post-docs to work with undergraduate students to complete their research. Our post-docs are often valuable mentors to our graduate students, since they have recently walked the thorny path of graduate studies. Post-docs can help undergraduate and graduate students by participating in the weekly breakfast meetings or contributing to the writing group. They are often one of the first to provide feedback when students want to practice a presentation before delivering it at a conference or volunteer to look over a poster before it is sent to the printers. Post-docs are also willing to lead many of our weekly Learnin' Luncheons, where we eat lunch together discussing a recently published scientific article. We consider post-docs to be our colleagues, as we will likely have interactions with them long after they leave HBREL. Therefore, we have a vested interest in developing them to become the best researchers they can be since we are likely going to be working together again in the future.

Faculty Mentorship and Training

One final group within HBREL that benefits from continual mentoring are us, the faculty members (Figure 6). Once you have finally landed that coveted faculty position, you can't just sit back and say, "Well, I've made it." We constantly provide mentorship to others and seek mentorship from our colleagues. In fact, in our Entomology and Nematology Department at UF, each junior faculty member (Assistant Professors, Lecturers, Assistant Researchers, etc.) will have a mentoring committee. Nobody wants another item on their To-Do list, but senior faculty are willing to sacrifice their time because they

know the power of mentorship and have relied on good mentors themselves. Our mentoring committees help review our promotion packets, suggest beneficial committee service opportunities, nominate us for awards and collaborate with us on grants and papers to help us increase our success.

Within HBREL, Jamie, Amy and I try to mentor, encourage and support one another in all that we do. The three of us set aside an entire morning each month to strategize for the lab as well as to mentor one another. If one of us has a major decision to make, whether it be a new idea for a project or direction we would like to take with a grant, we discuss it openly and honestly. There have been plenty of times where I was initially excited about an idea, only to have Jamie and Amy point out the reasons that it would not be a worthwhile endeavor. They have no doubt saved me from a lot of frustration and potential embarrassment, which is why I am grateful they continue to be mentors to me.

Discover the Joy of Mentoring

To a large degree, academia as a profession is a bit repetitive. I love being on the cutting edge, exploring and discovering truths never known before. However, the tasks we do each year are rather cyclical in nature. We seek grants to get money to do our research, we do the research, we publish our research. The more papers we publish, the more grants we get, continuing the cycle until we retire. However, mentoring gives us some variety and provides us with something much more valuable than a paper. Future scientists and beekeepers will eventually forget a paper that we wrote decades ago. However, our legacy moves forward by shaping other scientists. At the end of my life when I am on my death bed, I doubt that I will look back and say, "You know, I'm really glad that I published that one paper about a chemical that was toxic to *Varroa*." While I am certainly eager to make a new discovery and proud of the research progress, I imagine what will matter most is the people that I influenced along the way. At the end of it all, it's the people that matter.

I have spent this entire article talking about the mentoring that happens here at HBREL, but I likely didn't share anything that was radically new for you. Beekeepers are great mentors! With almost every beekeeper I meet, I like to ask them about their origin story in beekeeping. Invariably, there is always a great mentor involved. Someone who took time out of their busy schedule to show them the way. I promise that no matter what level of beekeeper you are, there is someone around you who is interested, but knows less or has less skill than you. If you are not currently mentoring another beekeeper, try it! Once your mentee begins to get the hang of it, don't stop being a good mentor. Even if your mentee becomes a better beekeeper than you someday, do not underestimate the influence you will forever have on them. Your opinion will be valued by your mentee forever, because you taught them something that changed their life for the better. Leave your legacy in beekeeping by mentoring someone else today. BC

Figure 6. University of Florida faculty members that focus on honey bee research, extension and instruction at the Panhandle Bee College event in Panama City, Florida, USA. From left to right, Jamie Ellis, Amy Vu, Bill Kern, Cameron Jack. Photo: Amy Vu, University of Florida

All The Buzzz in...

Hello Friends,

You are the sweetest friends a bee could have.

Bee B. Queen

Bee B. Queen Challenge

Be sweet to someone who could use a little kindness.

Honey Taffy

Making and pulling taffy is something both kids and adults can enjoy. Make this candy at family gatherings this fall or to give out on Halloween. All you need is honey and butter!

Directions:

1. Generously butter a baking sheet.

2. Place honey (3/4 to 1 ½ cups at a time) in a medium saucepan. Cook uncovered over medium-low heat until the honey begins to boil. Do not stir. Continue cooking until the honey reaches about 280°. You can use a candy thermometer or do a little test. Take a small spoonful of honey and plunge it in ice cold water. Pull a bit off the spoon. When it becomes slightly brittle it is ready.

3. Pour on the buttered pan.

4. Take a fork or oil covered spatula and gently keep folding the edges into the center as it cools.

5. Use plenty of butter on your hands so the honey will not stick. Continue folding the honey to form a ball. Split the ball into smaller pieces for each person to pull.

6. Stretch the honey into a long strand. Fold. Keep pulling and folding the honey until the color changes from a dark color to a soft tan.

7. Lay thin strands of the taffy about ½ - 1 inch in diameter on the baking sheet. Take a kitchen scissors and cut bite sized pieces.

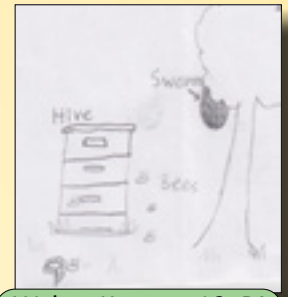
8. Cool in the refigerator. Wrap in waxed paper cut into rectangles.

Thank you Brookelyn Smith, age 8 and Teagan White, age 9 from Smithville, Texas

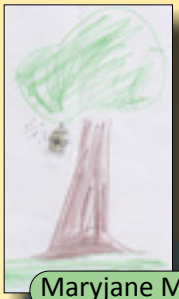
... Bee kid's corner

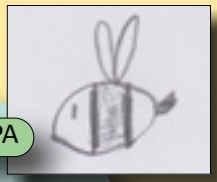
Produced by Kim Lehman
www.kimlehman.com
www.beeculture.com

October 2023



Walter Kanagy, 10, PA

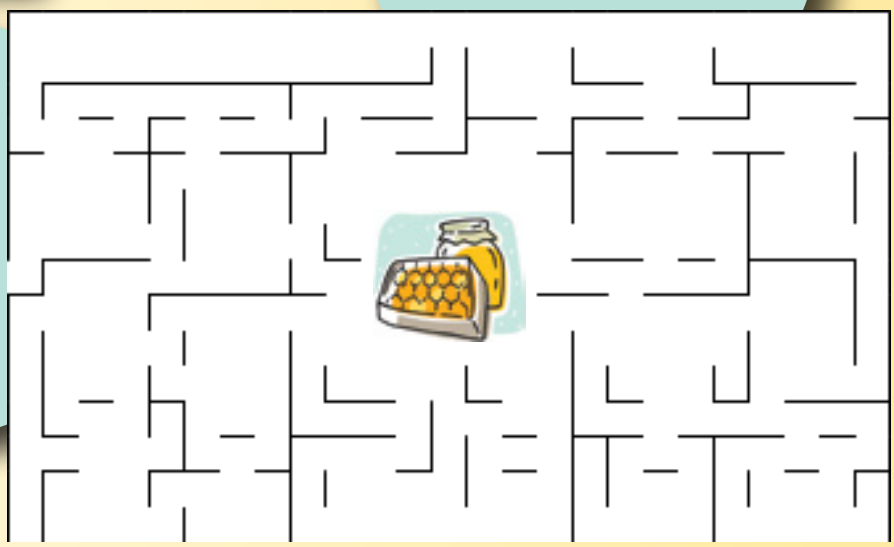


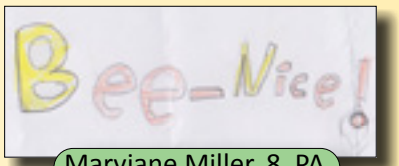


Maryjane Miller, 8, PA

When your parents go out to dinner they say, "Bee-Have"

Help Bebe find the honey.





Maryjane Miller, 8, PA

Taffy Tips

- Be very generous with the butter.
- You can use cooking spray instead of butter.
- Wash or soak the sauce pan immediately for easier clean up.
- The pulling will get harder as the taffy changes color. If you get tired, hand off to another person to continue the process. Teamwork!
- Try pulling the taffy between two people.
- Sprinkle a little salt on some pieces.
- The house will smell great!

Beecome a Bee Buddy

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

Name
Address
Age
Birthday Month
E-mail (optional)

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

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

Off the Wahl Beekeeping

THE QUEEN OF THE HIVE

Richard Wahl

Hive Traits Are Largely Queen Dependent

When I began my efforts to become a self-sustaining beekeeper five or six years ago, I remember being fascinated by the fact that each of my eight hives that Summer had different and sometimes very distinct personalities. I mentioned this fact to a fellow bee club member and it resulted in a conversation about what would cause these contrasting traits.

Although I felt my hives had been treated the same and had the same surrounding resources from which to collect pollen and nectar, the variations by Summer/early Fall were quite noticeable. Some of the dissimilarities could be attributed to splits or swarm captures or possibly a new package purchased the past Spring to diversify the race of bees I currently had.

But certain differences could only be attributed to the queen of each individual hive, particularly when those queens were splits from the same parent hive or were daughter offspring from the same parent queen mother. I have found that the queen, whether from a split, a swarm catch or a purchased package, will set the tone of the hive and also the honey production capacity, even when all external environmental and surrounding nectar gathering potential remains the same.

I distinctly remember one hive in particular that Summer that seemed to need another honey super every few weeks, far surpassing the production of most of the other hives. In another case, one hive in particular was very testy and had bees much more likely to challenge my veil than a hive right next door that seemed indifferent to my inspections or hive mite treatments. In yet another hive, the mite population was always extremely low compared to a nearby hive that had several mite explosions despite treatments.

A 2023 queen marked in pink as some beekeepers have a hard time seeing red. Notice her size compared to the nearby worker bees.

The point being that in many facets of hive growth, honey collecting potential, mite mitigation and ease of handling the hive, the queen sets the tone and personality of that particular hive. As she passes her pheromones to workers in the hive that are constantly touching, feeding and caring for her, she passes those traits onto the thousands of workers supporting that hive and through the eggs she is laying.

Locating the Queen

One of the more challenging aspects for new beekeepers is locating the queen among the thousands of bees throughout the hive, particularly if she is unmarked. As with all other aspects of beekeeping, there are a few techniques that can be employed to make this task a bit easier.

The first step is to use as little smoke as possible before entering the hive. Just a brief puff or two at the entrance should be enough to hide the alarm pheromone of any guard bees. An additional brief puff or two just under the raised edge of the inner cover above the top super should also settle the bees a bit before removing that inner cover. A lot of smoke used before entering the hive may cause the queen to be much more mobile and also cause her to seek a good hiding spot. It may also cause other bees in the hive to move more frantically rather than just going about their duties as they normally would. Before pulling any frames from the super, look to see where the most bees are actively moving about on the tops of frames. Make a mental note of this area as it can be a good clue to the whereabouts of the queen below on the frame under that concentration of bees at the top. Pull the first or second frame in from the side of the super and give the frame next to it, still in the hive, a quick look. Two frames may need to be pulled to get a better look at the still inside next frame. The queen can often be spotted on that next frame as she moves across it.

Begin by glancing around the edges of the frame and in a circular fashion, move your eyes to the center of the frame. If no queen is seen, check the reverse side of the pulled frame in the same manner, being sure to take a quick look at the bottom and top edges of frames in the event the queen is moving from one side to the other. If the pulled outer frame is nearly full of pollen, nectar or capped honey it is unlikely that the queen will be on that frame. Spend only a few seconds quickly viewing both sides of this type of frame.

As subsequent frames are pulled, if the frame is near full of capped brood and/or corner areas filled with pollen or nectar it is also unlikely the queen will be spending her time on this type of frame. Remember that you are looking for a bee that has a unique appearance compared to the other workers. The coloration of the queen is most often a bit lighter or darker than that of the worker bees, although on occasion, I have found a queen to be of near similar color to the workers. Queens have a more elongated abdomen, so you are focusing on seeing a bee that looks a bit different.

Queens will often have a retinue of workers all facing her while feeding, cleaning and touching her to access her pheromones. Queens like to stay in darker areas of the hive and may scurry to the backside of the frame you are inspecting to get out of the more direct light. This is the reason to take a quick look at the backside of the pulled frame before a thorough check of the front side.

As frames are found to have more larva and eggs present with less capped brood, there is a greater likelihood of finding a queen on the frame. She is more likely to be on a frame with recently laid eggs and small larva, particularly if there are also open cells in which to lay more eggs. Chances are that this frame was also under the larger cluster of bees seen earlier when looking at the frame tops. Spend more time looking at this type of frame than those that are completely empty or covered in nectar and pollen.

If the queen is relatively undisturbed and she has her butt in a cell laying an egg while surrounded by other bees she will be near impossible to spot. She may also have her head in a cell checking out its potential for an egg.

Virgin and younger queens move around at a much faster pace than those that have been laying eggs for some time. Experienced queen egg layers are usually quite focused on checking out available cells moving deliberately across the foundation cells.

If unmarked, this queen with a red dot under another bee would be hard to spot.

Have a reason to find the queen. A spotty brood pattern, lack of eggs near small larva, the determination to split a hive or the desire to mark a queen may be good reasons to search for her. On the other hand, if the inspection is simply to see that a queen is laying eggs properly and performing her duties adequately, that may not be a good enough reason to continue searching for the queen. Eggs standing on end are an indication that a queen was present in the past day. Eggs that are lying on their side, soon to become larva, are more likely to have been laid two or three days ago. As eggs get closer to the third day larva stage they will be surrounded by a shiny, cloudy, royal jelly mix that was secreted by the attending worker bees in the egg cell. If the secretions continue to be of royal jelly the cell will be elongated and a new queen is being developed, most likely in a previously prepared slightly fatter queen cell cup.

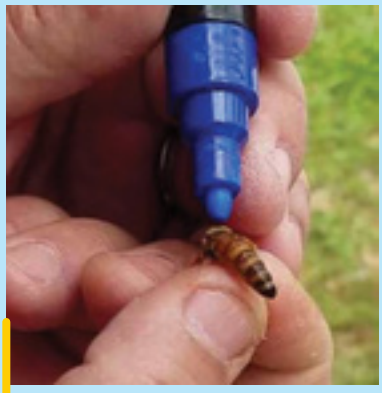
In nearly all cases, as the egg goes through eclosure (a fancy term for the dissolving of the egg surface) and as it becomes a larva, it is fed a protein mix of pollen and nectar which results in a worker bee emerging 21 days after the egg was laid. Finding numerous, eggs quite often next to small larva and capped brood, is a sure sign the queen was present and actually seeing the queen becomes unnecessary. In either event, as frames are inspected and slid sideways to make room to view the next frame, replace them in the same order to provide the least disturbance to the hive.

If the queen was seen, wait until she is away from a frame edge and moving toward a frame's middle so as not to pinch her between frames as they are replaced. It has been estimated that it takes bees a day or two to recover from a full hive inspection after the beekeeper has interrupted the airflow, temperature and humidity control within the hive.

Marking the Queen

Once the queen has been found, there are several techniques the beekeeper can use to mark a captured queen. Before opening a hive and finding the queen, be sure your marking pens and capturing equipment are ready and easily accessible. A variety of marking paint pens can often be found on the market in sets of six to eight in craft stores or hobby shops. Buying a set of different colored pens is normally more cost effective than buying just one color for the current season. Five colors are commonly used with the colors rotating through five year increments.

WHITE: Years ending in 1 or 6
YELLOW: Years ending with 2 or 7
RED: Years ending with 3 or 8
GREEN: Years ending with 4 or 9
BLUE: Years ending with 5 or 0.



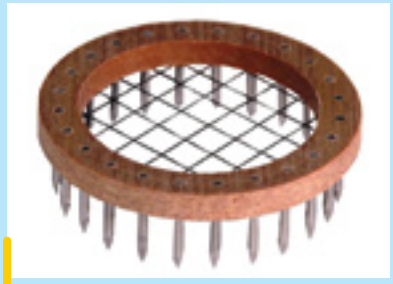
A queen held by her two back legs being marked in blue in 2020.

If the hobby beekeeper is not selling queens or nucleus (nucs) hives with a queen, they may choose to simply use one color when not concerned with the year the queen was raised. Always give the pen a good check to see it works properly before opening the hive. Also, have any queen catcher tools ready. I like to keep my pen and queen catcher in a bee suit pocket if I know I might want to mark any queens during hive inspections.

The first step after locating the queen is to capture her. This can be done by picking her up by hand grasping her by the wings or thorax. Do not squeeze or pick her up by the extended abdomen as this could easily damage her. Practice on drone bees first to get the technique down as drones cannot sting.

One handed queen catcher with soft Styrofoam plunger and movable slotted top.

Since I find this bare handed technique to be challenging, even if using latex or thicker nitrile gloves, I use a plastic queen catcher with a mesh screen and foam plunger, carefully herding the queen into the catcher once found.



Push-in marking queen catcher.

Once the catcher is placed over the queen, letting her crawl up the catcher side before closing it helps insure the queen will not get pinched in the catcher. There may be several worker bees caught with her, but they will either squeeze out through the catcher openings or be pressed against the surface the same as the queen with only the queen getting marked with paint.

Other catchers are simply a fine wire or string mesh with smaller sides that can be pushed into the foundation comb such that the queen is gently trapped under the mesh. A homemade push-in queen catcher could be made out of a ⅛-inch hardware cloth with four sides bent down to form a small five sided box.

Just a touch or two of the paint pen to her darker thorax, the bare back portion of her body from which the legs and wings extend, should be enough to make her more easily spotted during future inspections. *Do not* get paint on her wings or abdomen as this can be sensed as a less than perfect queen by the worker bees who may then decide to replace her.

I once made the mistake of laying the queen in the queen catcher outside the nuc from which she came. I wanted to check the remaining nuc frames for adequate brood and that the queen was laying eggs in preparation for the nuc's sale. As I replaced the last frame I noticed bees from a nearby hive had crowded into the queen catcher and were in the process of smothering, stinging and crushing her. This is called balling the queen and is the method bees use to euthanize (perhaps too gentle a term) a queen the bees do not accept. I could not save a very good looking, new queen that had laid a nice egg pattern. Another lesson learned in beekeeping. Keep the queen on frames in her own respective nuc or hive.

Replacing the Queen

The decision to replace a queen may be for several reasons. Perhaps the queen did not mate well and has a spotty brood pattern or she may be a drone layer. Compared to other hives, she may not foster as strong a honey collection as others. She may be managing a particularly aggressive or testy hive. Or if nearing the end of her second or third year with decreasing egg production, it may be time to consider her replacement.

A spotty brood pattern. If other frames appear the same, consider replacing the queen. Photo by Judy Tobey

A beautifully capped brood pattern that appeared on four plus sides of frames in this hive. Note the capped honey along top edge and corners.

A low population of bees in a hive will be detrimental as a heavily populated hive can more easily fight off disease, chase out hive beetles, fight off mites and produce a greater quantity of honey. I know of some commercial beekeepers who like to replace their queens every year or so, on a set schedule, to have a new, strong, overwintered queen to start each new pollination or nectar collecting season. As a hobby beekeeper, I do not find this to be necessary and allow the bees to determine their replacement timing, provided the hive is functioning satisfactorily.

When I do make splits or starter nucs for future sale or sustainable personal use, I do make sure to select egg frames and/or grafting frames from my best trait hives, be it strong honey production, low mite counts or ease of handling and inspecting the hive. These would all be the most desirable traits to pass onto future queens and workers. Having done so for the past five years, I feel I have increased my overwintering potential success as well as the quality of my hives that have had past seasons to acclimate to my specific environmental conditions. If adding a newly purchased queen, the hope is the seller has selected queens from hives with the most favorable traits, however there are no guarantees. Selecting from your own hives at least gives you a basis of past performance for comparison.

Whatever your reason for re-queening, realize that it may be a month or more for the new traits to take hold, during which time workers may still harbor a few less than desirable traits as a carryover from the previous queen. For the new beekeeper, pinching a queen is not an easy choice; however, if it will improve the performance of a weak, under-performing or less than healthy hive, it may be a better choice than allowing those less than desirable traits to be passed on to the next generation of bees. BC

Bees Love

Global Patties

You will too

Keep your hives strong and healthy with less effort and low cost
Reduce winter loss and see faster spring build-up
Help your bees thrive despite drought and stress from mites and disease

Two North American Factory Locations

Plus depots across the U.S. and Canada to Serve You Best

BAY 2 - 8 East Lake Way NE, Airdrie Alberta T4A 2J3
Phone: 1-403-948-6084 - Fax: 1-403-948-6901

150 Parkmont West, Butte Montana 59701
Ph: 1-406-494-4488 - Fax: 1-406-494-3511

Call Us Toll Free in North America at 1-866-948-6084

We make protein and pollen patties to your specifications
using only fresh, high quality, proven ingredients. Satisfaction guaranteed.

Be sure to visit our website

www.globalpatties.com

For our locations, news, ideas, specials, and much more...

Your bees will thank you

Formic Pro™ penetrates under the brood cap to target varroa mites where they reproduce, protecting developing honey bees for healthier, more productive colonies.

THE QUEEN OF VARROA CONTROL.

No Resistance • Kills Under the Cap • Residue Free • Organic

FORMICPRO

1-866-483-2929 | www.nodglobal.com

APISTAN

beehealth NORTH AMERICA

PROBABLY THE WORLD'S

NO.1

94% AVERAGE EFFICACY OVER 9 CLINICAL TESTS

VARROA CONTROL

TEST RESULTS

Apistan, lab study: **95.72%** Varroa mortality *(Insects, 2018)*

Apistan, field study: 84% efficacy (Apiguard: 86%; Apivar: 79%; HopGuard: 64%), @ Mississippi State University (Insects 2018)

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

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

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

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

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

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

Apistan: **95.22%** (2017, FNOSAD, France)

All new*

Apistan – *it's better* than ever before!*

* Actually, only the packaging has changed but if you haven't used Apistan for some time you may be surprised at how effective it is.

Apistan, now sold in North America by Vita Bee Health, is ideal for use in your Integrated Pest Management system, in rotation with a completely different product, such as Apiguard.

Vita Bee Health is a trading name of Vita (Europe) Ltd.

IT'S NOT THE WORLD'S NO.1 VARROA CONTROL PRODUCT BY ACCIDENT!

www vitabeehealth.com VitaBeeHealthNorthAmerica VitaBeeHealth info@vita-europe.com

BEE VET

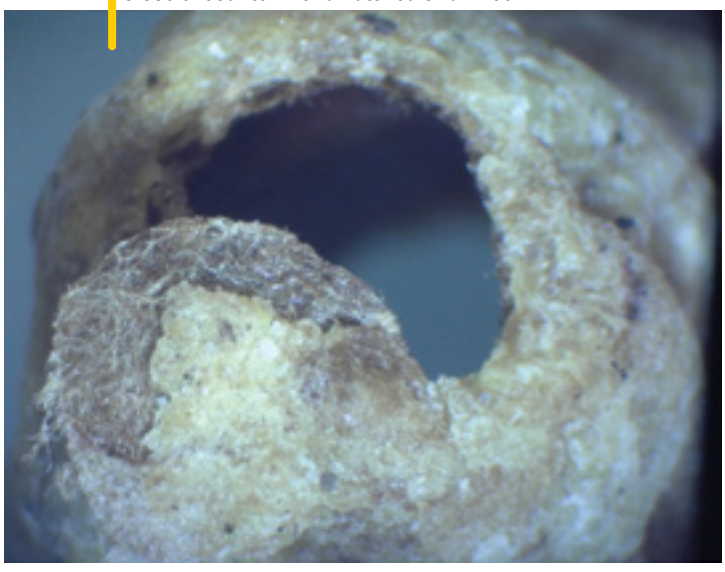
How to Stop Swarming

Dr. Tracy Farone

With a title like that, I know I got your attention. Essentially, there **is** one sure way to **stop** swarming. Kill your bees. A dead colony will not swarm. If you prefer to keep your colonies alive, read on for a biological, health based and practical take on how to manage this topic of much discussion.

Personally, I believe swarming is an overdone topic in the beekeeping literature. Many have opined on the subject to the point of ad nauseum per my appetite. So up until this point, I have resisted writing about it. However, people have asked me to write on the subject… so here goes.

Close encounter with a hatched swarm cell.



I have observed that the honey bee swarming phenomena involves and interacts within three major aspects of beekeeping: the biology of the bee, the sector of the industry and the psychology of the beekeeper.

The Psychology

There is no denying that swarming is a fascination amongst the general public and many beekeepers, especially newer beekeepers. Many want to know the "secret" to stopping it, controlling it, like a quest for the Holy Grail. All types of gadgets, equipment, sprays and folks dressed in bee beards in precarious, peculiar places are devoted to capture this phenomenon. Beekeepers have favorite swarm stories to tell and one-up the next guy. Is it the excitement of the chase? The wonder of nature's workings? Or the "cool" (and somewhat narcissistic) reputation of being a bee wrangler?

Why do some hunger for more information on this age-old subject? I suspect it is analogous to weight loss. Everyone is looking for the next magical cure, gadget, plan or pill. Everyone also, already knows what it really takes to lose weight is obvious math (do not eat more calories than you burn throughout your entire life) but that's hard and boring and takes consistent devotion. We also already know how to *manage* swarming, but it takes a consistent plan, and it is still going to fail sometimes. But of course, this approach lacks ease and pizzazz.

I have also observed that most beekeepers, if they make it past a couple of years, go through what I call the progressive Stages of Swarm Management: Stage 1: Amazement, Stage 2: Annoyance, Stage 3: Acceptance.

Stage 1: Amazement, dominates in newer beekeepers. That first swarm you successfully caught or that weird local circumstance – Amazing! But after a few annoying phone calls at exactly the wrong time from unhappy neighbors and/or loss of your favorite queen… Stage 2: Annoyance enters the arena of the mind.

Recently, I had the opportunity to take a less than 24-hour horseback riding/camping trip into the "wilds" of Pennsylvania with a few family members. Which means I dared to leave town overnight. That same day a swarm occurred from a split I had made the previous day to *prevent* swarming at my campus's apiary site. But the moved, mated queen did not like her new abode, so she moved about a ½-mile away, right in front of the main science building on campus on a small ornamental tree lining the main walkway. Yes, in front of the building in the CENTER of campus with HUGE windows. Once I got back into cell phone range that evening, my phone was blowing up with emails, texts and calls from everyone and someone's mother about the ominous swarm on campus. I arrived the next day to see yellow caution tape and a crowd of nervous on-lookers wondering why I had not commissioned a jet to arrive sooner. The modest size swarm was resting peacefully on a lower branch of the small tree just within reach. My students and I easily caught the swarm, I gave the insurrectionist queen and her colony to a gracious beekeeping neighbor, and I have provided repetitive educational talks and pamphlets about swarms to the concerned crowd. Yet, I continued to receive paranoid calls to come and get the swarm again over the next several days, because clearly, I missed the swarm. I drove back to the area for several days to witness a finger full of bees clinging to the branch's residual queen pheromone, caution tape still intact. I prayed for rain. It still did not matter. I was officially revisited by Stage 2.

Stage 3: Acceptance comes along with time, patience and perseverance. Maybe old age and just being tired. It brings peace to accept that you cannot always control everything despite your best efforts within the best practices. Of course, portions of all stages will still be represented in the emotional and psychological state of the beekeeper. However, with experience and time, most beekeepers mature to Stage 3 dominating their overall outlook of swarming with various inklings of Stage 1 and 2 still within their minds.

Industry Management Caveats

From what I have observed, swarming concerns are found within

Our interactions with swarms.

the common vernacular of backyard to sideliner beekeepers. Commercial/migratory beekeepers, those that make a living doing this and manage most colonies in this country, have bigger issues to deal with and innately manage swarming within their typical SOP. Commercial beekeepers manage herds of honey bees by the yard or truckload. Each group has a working purpose, whether pollination, making nucs, packages or queens. These beekeepers keep their hives relatively small, busy and moving. Inspections are done by the yard. Inspections are done quickly and decisively, with queen replacements in their back pockets. Their colonies are typically not big, fat, tall backyard hives with nothing better to do than swarm. If they do happen to park their hives in a clover field to "rest" for the Summer, they mostly let them be bees and replace queens if/as needed. Economically, it is simply not beneficial to them to chase after possible swarms. They live in Stage 3.

For the rest of us, swarm management is not about stopping swarming. Anyone telling you that completely stopping swarming is possible is either an oblivious beekeeper, a gas lighter, trying to sell you something or all the above. As a vet, if there was a way to "neuter" honey bees, I would have found one. There is not. Swarm management is about awareness of the honey bee's biology, what your goals are and how you can intervene to provide stewardship to this natural process.

The Biology and Health Considerations

First if you are not in your "queenright" hive(s) every seven days within the beekeeping season – you simply do not know what is happening inside that hive. If you only do inspections on your hives once a month (or less) you **will** miss many swarms. That is not my opinion, that's biology. Ignorance is bliss is not a strategy based on reality here. Those that believe/claim that their hives "never" swarm live in this happy and clueless place.

Swarming is a natural process that occurs in healthy, often vibrant, honey bee colonies as part of their reproduction cycle. Swarming (but not absconding) indicates that the hive is healthy and has enough reserves to reproduce. It has some benefits to the bee and beekeeper and some downsides. It provides a brood break for the stationary colony that is helpful in reducing or slowing down various diseases that affect the brood, including our chief nemesis, *Varroa destructor* and the many viruses it vectors.

It allows for re-queening, through a returning virgin or an introduced mated queen. Re-queening is often a remedy for getting things back on tract within a hive, whether it be disease recovery, poor brood patterns/faltering old queen or colony behavioral problems. The swarming nature of the honey bee, in part, allows us to utilize their system to create new hives to replace those that are lost within the current disease and environmental challenges our bees face.

One should also consider your purpose with your honey bees. Do you just want a few hives? Do you want to make a lot of splits? Do you want to make more honey or nucs? What equipment do you have available? Do you really like that queen

or not? How much effort you put into controlling swarms may depend on what you are trying to do. There are various actions we can do to slow/manage swarming if that is your desired effect.

Things that slow swarming down:

1. Adequate space before they start to swarm. Whatever that means to different bees may vary. Drawn comb is better space.
2. Clipping mated queen's wings, so she cannot fly away... I have had a clipped queen swarm onto the ground ten yards away from her original hive. One must appreciate her grit.
3. Reversing boxes – even deeps. Bees like to go up. Reminding them they have space in the basement can sometimes slow swarming.
4. Knocking off empty queen **cups** – might give you another week. If it is a queen cell/swarm cell it is too late to stop the swarming behavior, but you may still be able to find the queen mother and move her. If it is capped, it is too late. She has gone and now you are left to decide what you would like to do with her pupating daughters. If you want only the original hive, knock off all queen cells but two or you can divide up the hive and try to make multiple nucs per couple of cells. If you do not know the difference between a queen cup and swarm cells, do some reading on the topics asap.
5. Splitting. Move the queen mother if you can... to another yard if you can, with more honey and less brood frames. Re-queen or be sure to leave eggs in the original colony and recheck in a week for the appropriate number of queen cells/emergency cells.
6. Caging the queen. Personally, I have not done this so I cannot speak to it much. But if the queen is in jail, she cannot leave, it provides a brood break and a population hold. It also requires intense management timelines. You must go back in and release her at some point and the process could damage the queen and/or negatively change the pheromone balance within the colony.

Big swarm

7. Some races/genetic lines may be less likely to swarm or may be more likely to swarm. You can experiment with it as you wish. I would recommend buying an extra box of tissues for when you watch

New queen emerging.

your designer queen sail fifty feet up into the forest.

8. Telling the bees you are leaving so they do not swarm. Okay, so there is no scientific proof for this, but it is an endearing adage. For me personally, if correlation equaled causation, the data would be compelling. Much "science" has been proclaimed with less.

Things that do not help slow swarming (as much as one may hope):

1. Undrawn comb for "space".
2. July-November – Swarm season is over! Nope, not really.
3. Fencing.

Reasons to try to prevent swarming:

There are reasons beekeepers should consider making an effort to manage swarms.

1. Spreading feral hives into the environment and the problems therein.
2. Increasing competition with other native pollinators.
3. Increasing disease spread.
4. Unhappy neighbors.
5. Public health safety concerns.
6. Phone calls, texts and emails at the most inopportune time.
7. Ultimate death of the swarmed, now feral colony.
8. Loss of control of queen/genetics in the hive.
9. Risk of failure to re-queen.

Reasons to not feel bad when they swarm:

1. Keeps hive size more manageable. Any more than five to six boxes are taller than me anyway.
2. Brood break.
3. Fresh virgin queen, a chance to change age, performance, disease, attitude.
4. It is a positive indication of hive health.
5. Slow brood diseases.
6. Keeps honey in one hive. Instead of splits. You ran out of equipment anyway.
7. Fun playing with queen cells/swarm cells.
8. Chance to try/introduce a new queen.
9. You are human and need a life outside the beeyard, too.

The Last "Take Away"

Hopefully, you have noticed that I have tried to supply a summary of practical advice on swarm management along with some beekeeping humor to keep it real. My best overall advice is (and I have not really heard this much in the literature): Have a seasonal swarm management plan fit for your purpose and expect the bees to not always read the books, ESPECIALLY AS FALL APPROACHES. I hear a lot of talk about swarm season in the Spring months and while it is true that swarming more commonly happens in the Spring, it can also happen throughout the Summer and Fall, especially if you have good weather conditions and healthy bees.

The problem with this time of the year is with less time to requeen and recover, Fall is the time when swarming can be "deadly" to colonies. Spring has time and resource forgiveness for swarming. Fall does not. I would suggest that this is the most crucial time to have a plan for the possibility of swarming. Do you have a late source of queen replacements? Are you going to combine hives? What if it gets too cold to inspect? Awareness of how to prevent or take your "losses" in the Fall may be a good strategy for making it through the Winter and flourishing the next Spring. BC

Bee Good to your Berries

Stock honey bees wisely and think beyond your farm to boost pollination

Ross Courtney

Originally published in the July 2023 issue of *Good Fruit Grower*

Small fruits specialist Lisa Wasko DeVetter of Washington State University points out bags intended to exclude pollinators at a commercial blueberry field in Mount Vernon in July 2022 as part of a pollination field trial.

Intuition might tell blueberry growers to place as many honey bees as close to their crop as possible.

But early results from a nationwide blueberry pollination research project suggest more nuance.

Dispersing colonies along the field edge and stocking more hives do not increase bee visits, yields or berry weight. Meanwhile, landscape structure, hive health, plant physiology and horticultural practices do matter.

"Pollination is important, but it's only one piece of the puzzle," said Lisa Wasko DeVetter, a small fruits specialist at Washington State University's Mount Vernon research center.

Data so far from a wide-ranging project at four universities may debunk a few myths regarding blueberry pollination, which scientists believe has been understudied given the fruit's rapid surge in production, acreage and value throughout the world.

Researchers from Washington State University, Oregon State University, Michigan State University and the University of Florida are participating in the project, funded by a $2 million grant from the U.S. Department of Agriculture's Specialty Crop Research Initiative.

Hive Density

Take hive density. Growers are tempted to stock as many hives as they can afford, figuring the more bees, the better. That's only true up to a certain point, because bees don't really care about property lines, DeVetter said.

In 2021 and 2022, DeVetter's colleagues in Michigan and Flor-

A research technician weighs blueberries to collect yield data at the Washington State University research center in Mount Vernon.

ida compared bee visits and berry weights from fields with densities ranging from two to six hives per acre. Bee visits and berry weight — a yield metric — were not affected by increasing hives per acre.

However, a different study done in Washington showed bee visitation is influenced by hive density in an overall landscape within 1,000 meters beyond the borders of a field.

That means neighbors matter. Some growers in Whatcom County, one of Washington's top producing regions, already stock their own fields while taking into consideration their neighbors' hive densities, DeVetter said.

The researchers measured results of the pollination trials by physically walking marked rows and counting how many bees they saw working blooms. They also counted seeds and weighed berries. Heavier berries and greater yields indicate better pollination.

Hive Placement

Hive placement within a grower's operation also makes a difference.

Growers often ask beekeepers to place hives immediately adjacent to their fields, figuring that will make it easier for the bees to spread out and do their work. Honey bees tend to have a low attraction to blueberries, compared to other blossoms, DeVetter said.

However, that practice may just cause unnecessary headaches for the beekeeper, already expected to trudge through muddy conditions at night under intense deadlines.

Turns out, clustering hives in a few locations away from field edges works at least as well, if not better, said Kayla Brouwer, a graduate student at WSU-Mount Vernon who helped with the research. In trials in 2021 and 2022 in Michigan, Washington and Oregon, researchers counted at least as many bee visits from hives clumped together, compared to those stretched along field edges. In Washington, under optimal pollination conditions, bee visits actually increased with clustering, Brouwer said.

Berry weights from those fields were similar, too, researchers said.

The reason is uncertain, but theories include the possibilities that adjacent hives compete and forage harder or radiate heat for each other and fly earlier.

The unbagged cluster of blueberries (top) ripened and grew, though imperfectly because of the poor 2022 pollination season. The bagged cluster (bottom) developed zero fruit without pollinators.

Pollinator Habitat and Pesticides

In another result, the researchers learned that Northwest blueberry growers can boost wild pollinator populations with semi-natural habitats, such as a strip of flowers, a hedge row of trees or areas of forest and grasses, near their fields. Earlier studies from Michigan and Florida have shown the same.

Bumblebees, for example, are an effective blueberry pollinator. Compared to honey bees, bumblebees and other alternative pollinators often fly in cooler conditions, such as those in drizzly Western Washington and Western Oregon. Sometimes blueberry growers struggle even to obtain honey bees at all because beekeepers, who travel the nation with their colonies, don't always want to stop in blueberry country.

Researchers also, are measuring how colony placement affects pesticide exposure. That work is still underway. BC

Originally published in *Good Fruit Grower:* **https://www.goodfruit.com/**

Beekeeping
A Doorway to Nature

Listen along here!

It has been suggested that a spiritual crisis is at the center of the long emergency we collectively face. This crisis manifests itself as a disconnect from the natural world and is considered by many to be one of the primary forces driving the growing degradation of environmental health. When we see ourselves as separate from the natural world, we view nature through the lens of how valuable it is to us personally, either economically or for its beauty. This is the typical Western approach to the notion of pristine wilderness. When we place such values on the natural world and its "resources" viewing it simply as a means to gain financial wealth or other material benefits, it can reinforce our separation from it.

Research indicates that people who have a strong emotional and spiritual connection to nature are more likely to behave positively towards the environment, wildlife and habitats. This suggests that nurturing a greater connection to the natural world among the general population may be critical in addressing our spiritual crisis and helping to reverse the current environmental emergency. There are many ways this nurturing of our connection can manifest including hiking and camping, fishing and hunting, farming and gardening, or bird watching.

For the readers of *Bee Culture*, beekeeping likely provides one of our primary windows into the natural world. Through beekeeping, we enter the fascinating world of the honey bee; from the waggle dance and the intricacies of swarm behavior, to honey bee biology and the production, use, and unique characteristics of the products of the hive. Our fascination with bees stems from our personal connection to them and our deep understanding of them and their ways. It has been claimed that the honey bee and beekeeping is the most studied and written about topic in the world, second only to us humans. The truth of course, is that all living creatures are absolutely fascinating: we just tend to be clueless to most of the wonder, beauty and amazing intricacies and relationships involved in the lives of the plants, animals and insects that surround us and that we may come into contact with. We simply don't interact with them enough to understand them and their ways, as well as we do the honey bee, and this can result in their being under-appreciated.

The world of beekeeping acts as a doorway through which we are able to then connect with the wider natural world of all the pests, diseases, plants and weather patterns that impact our bees; for better or worse.

The truth is that we are not separate from nature and the earth. Our bodies are literally made of the same minerals of the earth; we live our lives on the earth surrounded by the natural world; and when we die our body goes back to the earth and eventually gets recycled by the natural world. What we do to the natural world, we do to ourselves. We may not die when a rare pollinator dies out and becomes extinct, but surely a small part of something within us dies, something sacred and precious.

A host of studies have pointed to the fact that the stronger our personal connection to the natural world, the greater our concern for the environment (Whitburn et al., 2019; Mackay and Smidtt, 2019). There is also strong evidence of a positive relationship between a person's connection to the natural world and one's personal health, wellbeing and happiness (Capaldi et al., 2014; Barragan-Jason et al., 2023). When individuals are exposed to natural environments, such as mountain tops, coastlines, meadows and forests, the exposure results in stress reduction and assists in mental recovery following intense cognitive activities. It has even been found that a hospital window view onto a garden-like scene can be influential in reducing patients' postoperative recovery periods and analgesic requirements.

Embedded in diverse cultures around the world is the idea that people consciously and unconsciously seek connections with the natural world. The theory that this is a result of evolutionary history where humans have lived in intimate contact with nature was initially put forward by Harvard biologist and two-time Pulitzer prize-winner, E.O. Wilson, in the Biophilia hypothesis (Wilson, 1984). We humans appear to be innately attracted to other living organisms. Evidence suggests that this is particularly evident when life becomes difficult and stressful. How many of us can deny the relaxing effect of a quiet moment by a lake, the soothing effect of sitting by a river, the rejuvenation of a hike through a forest, a stress reducing stroll by the seaside, the calming effect of simply cuddling with a pet dog or cat, or spending time with the honey bee colonies in our apiaries. Simply put, we need contact with nature and the importance of our ability to connect with the natural world has only grown due to our increasingly urban, digital-screen and social media lifestyles that often serve to disconnect us from nature which in turn, may contribute to health and wellbeing problems.

One meta-analysis suggests positive short- and long-term health outcomes with improved self-esteem and mood with exposure to green environments. Proximity to water generated some of the greatest changes and the mentally ill experience the greatest self-esteem improvements (Barton and Pretty, 2010). Other researchers examining the link between finding meaning in life and our relationship to the natural world suggest numerous benefits that arise from a person-

Beekeeping provides a doorway through which individuals can develop a strong spiritual connection to the natural world, especially those living in urban or suburban environments.

al connection to the natural world. Not only does nature help us find meaning in life, it can enhance our appreciation for life, and how engaging in nature-based activities (such as beekeeping) "provides an avenue for many people to build meaningful lives" (Passmore and Krouse, 2023).

The idea that contact with nature benefits our mental and physical health appears to be strongly supported by the statistics. According to one researcher, "Animals have always played a prominent part in human life. Today, more people go to zoos each year than to all professional sporting events. A total of 56% of U.S. households own pets. Animals comprise more than 90% of the characters used in language acquisition and counting in children's preschool books. Numerous studies establish that household animals are considered family members; we talk to them as if they were human, we carry their photographs, we share our bedrooms with them" (Frumkin, 2001).

Beekeepers have their own version of this in what is referred to as the "telling of the bees." A tradition where it is believed that when the beekeeper dies, someone has to go tell the bees and perhaps hang a piece of black cloth on the hive to place it in mourning or else the colony would die out or abandon the hive. There appears to be many versions of this. Others tell the bees about important events in their lives particularly regarding a death in the family. Considering how easy it is for a beekeeper to put off caring for their bees with our busy lives, this tradition practically served as a way to keep the hives in the thoughts of those that survive a deceased beekeeper, so that they will hopefully prioritize finding a new custodian to take over responsibility for their care in a timely manner.

As a deep personal connection to the natural world, beekeeping has the potential to provide numerous benefits to its participants. Beekeeping encourages one to get exercise along with fresh air and sunshine, and there is significant evidence that suggests that even the occasional bee sting can help fortify the body's immune system allowing it to more effectively deal with various ailments (provided of course that the person is not hyper allergic to honey bee venom). Beyond all this, we now know that beekeeping can also help establish a spiritual connection to the earth and all the life forms with which we share this planet; a connection that may be critical in our ability to effectively deal with our current reliance on damaging green-house gas emitting technologies that are

slowly turning our lives and society upside down.

Many people are suggesting that the weather extremes we have been experiencing around the country and the world is the problem, when really the problem at its base level is the malevolent actions of individual people. Nurturing a greater connection to the natural world in greater numbers of people, such as through activities like beekeeping, might just hold part of the salvation for this world. Something to consider as you go about the business of caring for your bees this Autumn and are tucking your colonies in for the long Winter ahead. BC

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

Just the same as a month before,—
The house and the trees,
The barn's brown gable, the vine by the door,—
Nothing changed but the hives of bees.

Before them, under the garden wall,
Forward and back,
Went drearily singing the chore-girl small,
Draping each hive with a shred of black.

Trembling, I listened: the Summer sun
Had the chill of snow;
For I knew she was telling the bees of one
Gone on the journey we all must go!

An excerpt from the poem
Telling the Bees *by John Greenleaf Whittier.*
Read the full poem here: **https://www.poetryfoundation.org/poems/45491/telling-the-bees**

References:

Barragan-Jason, G., Loreau, M., de Mazancourt, C., Singer, M.C., Parmesan, C. (2023) Psychological and physical connections with nature improve both human well-being and nature conservation: A systematic review of meta-analyses, *Biological Conservation*, Volume 277:109842

Barton J, Pretty J. (2010) What is the best dose of nature and green exercise for improving mental health? A multi-study analysis. *Environmental Science & Technology*, 44(10):3947-55. **doi: 10.1021/es903183r**. PMID: 20337470.

Capaldi, C.A., Dopko, R.L., Zelenski, J.M. (2014) The relationship between nature connectedness and happiness: a meta-analysis, *Frontiers in Psychology*, Volume 5

Howard Frumkin, (2001) Beyond Toxicity: Human health and the natural environment, *American Journal of Preventive Medicine*, 20(3):234-240, ISSN 0749-3797, **https://doi.org/10.1016/S0749-3797(00)00317-2**

Mackay, C.M.L. and Schmitt, M.T. (2019) Do people who feel connected to nature do more to protect it? A meta-analysis, Journal of Environmental Psychology, 65:101323

Passmore, Holli-Anne and Krouse, Ashley, N. (2023) The Beyond-Human Natural World: Providing Meaning and Making Meaning, *International Journal of Environmental Research and Public Health*, 20(12):6170

Whitburn, J., Linklater, W., Abrahamse, W. (2019) Meta-Analysis of human connection to nature and proenvironmental behavior, *Conservation Biology*, **https://doi.org/10.1111/cobi.13381**

Wilson, E. O. (1984) Biophilia: the Human Bond with Other Species.: Harvard University Press, Cambridge, MA.

Field Test

Paul Kelly Drone Spitting

Paul Kelly and Ken Warchol discussing pans for the smoker contest (one of the five contests in the Beekeeper Olympics)

David Burns

Empowering The Eastern Apicultural

In my years as a beekeeper, I've attended quite a few conferences. But there's one that has always managed to stand out in a special way. It was back in 2009 that I attended my first EAS conference in pursuit of becoming an EAS certified master beekeeper, and I've been going back for more ever since. I've often found myself pondering what exactly makes EAS such a draw for me and other beekeepers. This year, over 500 beekeepers attended the conference. Why is it that so many of us are drawn to the EAS conferences year after year?

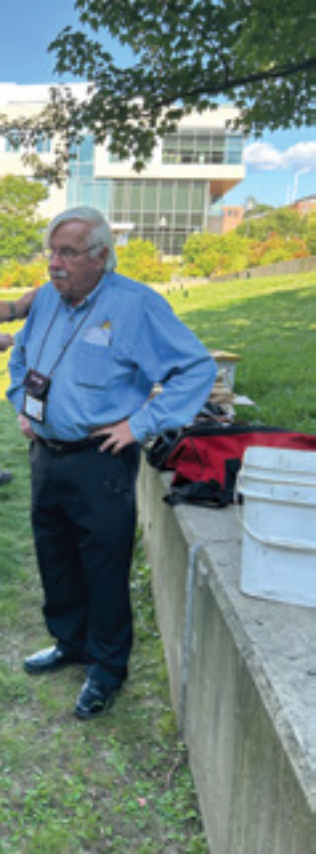
This year, I flew out to the university of Massachusetts in Amherst to attend the 68th EAS conference. Eastern Apicultural Society of North America, Inc. (EAS) stands as a beacon of education and research. Established in 1955, EAS has grown into the largest, noncommercial beekeeping organization in the United States and a global hub for beekeeping enthusiasts. With a commitment to excellence in bee research and the education of beekeepers, EAS continues to hold an annual conference that serves as a cornerstone event for beekeepers from around the world.

This year's theme was, "The Past, Present and Beeyond." It was remarkable how the campus architect reflected this same "journey through time" theme with its brutalist and dystopian architectural design in many buildings.

Master Beekeeper Certification: Nurturing Expertise

What originally drew me to attend my first EAS conference was my desire to become an EAS certified master beekeeper. In addition to education and research, EAS is renowned for its master beekeeper certification program. The EAS Master Beekeeper Program stands as a testament to EAS's commitment to excellence and is the grandfather of all master beekeeper programs. The MB program was started by Dr. Roger Morse at Cornell in 1981 and now EAS oversees the testing of all EAS master beekeeper candidates. It is a rigorous two days of testing. Candidates must attain a minimum score of 85 to pass the lab, written, oral and field tests. Once certified, EAS MBs become pillars of support for the educational arm of EAS, contributing to the growth and enrichment of the beekeeping community.

What's the draw for beekeepers? For me, it's more than the informative lectures and workshops. It's the unique opportunities for beekeepers



Drone Spitting

Frame Building Olympics

to dive deeper into demonstrations, hands-on experiences and evening social events with friends. In fact, at my first EAS in New York, I was in a microscopy workshop examining Nosema spores and met for the first time, Dr. Jon Zawislak. We've become lifelong friends, having met at EAS. I've also made so many other lifelong friends from EAS. Every year I attend, I make more friends and connections with beekeepers around the country, even around the world.

Another reason I keep going back is because once you become an EAS MB, they put you to work teaching. The Short Course, Monday through Tuesday, is a key component of the conference designed for beginners and intermediate beekeepers. This year, I spoke several times during the short course, as MBs are asked to conduct these workshops. Here, beekeepers can explore topics ranging from fundamental beekeeping techniques to specialized skills like queen grafting, disease detection and more.

The Main Conference, extending from Wednesday to Friday, features keynote presentations that set the tone for each day's proceedings. This year's keynote speakers were Dr. Tammy Horn-Potter, Dr. Samuel Ramsey and Dr. Judy-Wu Smart. Multiple tracks of presentations ensure that attendees can delve into their areas of interest, whether that's the latest in honey bee research, innovative beekeeping practices, or the art of apitherapy, candle making and more.

Cultivating Creativity: Beyond the Hive

The EAS conference goes beyond the confines of traditional beekeeping to explore the creative and diverse aspects of the craft. Workshops on honey show judging, honey bee photography and cooking with honey celebrate the artistry and flavors of beekeeping.

A unique and whimsical highlight of the conference is the Bee Olympics, where beekeepers showcase their skills in unconventional contests. One standout challenge involves spitting a drone from one's mouth to measure how far it can travel – a playful yet engaging way to test participants' bee-related talents. So, start practicing now for 2024! By the way, you can't kill a drone during the contest.

A Revered Guest: Rev. Lorenzo Langstroth

At an evening barbeque event, there was a special appearance by Rev. Lorenzo Langstroth as played by Marc Hoffman, adding a special historical touch. Reverend Langstroth, often hailed as the "Father of American Beekeeping," revolutionized beekeeping with his invention of the movable frame hive. His presence serves as a reminder of the rich legacy and innovation that continues to shape modern beekeeping practices.

Beekeepers Eastern Apicultural Society

Society's Annual Conference

Scholarship and Success: Celebrating Achievement

EAS's dedication to cultivating talent extends beyond certification of MBs to awards and scholarships. Yearly awards include the James I. Hambleton Memorial Award, the Roger A. Morse Outstanding Teaching Award, the Divelbliss Award, the EAS Student Apiculture Award and the Mann Lake EAS Master Beekeeper Scholarship Award. EAS desires to celebrate achievements by supporting those who are sure to enhance beekeeping in the future.

I had an opportunity to have lunch with the 2023 recipient of the Mann Lake EAS Master Beekeeper Scholarship award, Kyle Day from Missouri. For such a young man, Kyle has it all together in beekeeping. Kyle's participation in workshops, events, and networking opportunities at the conference embodies the true spirit of EAS.

Additionally, the recognition of Ayeah Gideon Gobti from Cameroon, the international winner of the 2017 scholarship, highlights the global reach and impact of EAS's initiatives. Gobti was unable to travel to the U.S. until this year and his attendance showcases the enduring influence of EAS's support, fostering connections and growth that transcends borders.

A Beacon for Beekeeping: EAS's Lasting Impact

As the annual conference at the University of Massachusetts in Amherst came to a close, the legacy of the Eastern Apicultural Society continues to reverberate. The event not only celebrates the intricate world of bees but also champions the spirit of learning, collaboration and community.

With its unwavering dedication to education, research and excellence, EAS stands as a beacon, illuminating the path forward for beekeepers, researchers and enthusiasts alike. As beekeeping evolves, EAS remains at the forefront, nurturing the passion and knowledge that sustain both the bees and those who care for them. BC

Bees and Women

Rachael Beatrice Pettit

Nina Bagley

Miss R. B. Pettit

Miss Rachael Beatrice Pettit was born in Belmont, Ontario, Canada in 1865. Her father, Sylvester Pettit, was born in Binbrook Township, in the County of Wentworth, Ontario, Canada in 1829. Sylvester Pettit received an excellent common-school education. He taught school for six years. Sylvester took up land in Dorchester, County of Elgin, Canada. He farmed the ground, raised bees and was an inventor of a honey evaporator (*ABC of Bee Culture,* 1888 pg. 102 – excerpt on next page). Becoming a wealthy man, he would live to be eighty-three years old passing away on March 12, 1912.

His family was from Scotland, and he was one of the first pioneers in the county of Wentworth. In 1852, Sylvester Pettit married Miss Abigail De Witt, a native of New Brunswick, and ten children were born from their marriage – six girls and four boys. Abigail was a consistent member of the Methodist Church, a devout Christian woman and deeply beloved by a wide circle of friends. Mrs. Pettit, having poor health for years, would pass away on January 15,1906. She was seventy-three years old.

Being the oldest of the girls, Rachael was educated in public schools and at Alma Ladies College in St. Thomas Ontario, Canada. According to her passport, she was five feet eight inches tall with brown eyes and light hair. She was Irish. Both of her parent's families had "an honorific award for military valor," making them a part of the United Empire Loyalist society.

Morley Pettit

Rachael's oldest brother, Hiram Pettit, was a fruit farmer in Fresno County, California. He had hives for pollinating the fruit farm. Her second most senior brother, Herman Pettit, was one of the largest landowners in the township, owning and operating over 450 acres, which he cleared and put under cultivation.

Rachael was talented and studied music and art, including painting in watercolors, oils and on china. After graduating from the collegiate department at Almas Ladies College, While preparing for graduation, she was offered a position there as an instructor of commercial subjects, which she accepted.

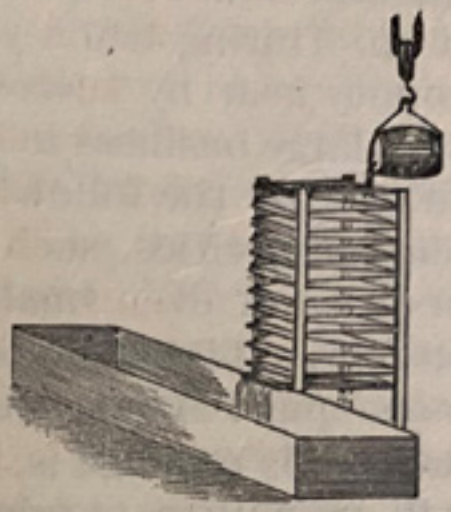
There was a thirteen years age difference between her and Hiram and eleven years between Herman. The 1891 census showed Rachael B. Pettit, age twenty-six, living in St. Thomas, Ontario, Canada. Her youngest brother, Morley, attended college in the same city during these years. He was the baby of the family and had never been away from home. So Rachael mothered him, taking him under her wing.

The two would develop a tight bond and would eventually become business partners. There was an eleven-year age difference between the two of them.

After graduation, Rachael would come home to rest. She would eventually work for two years as a secretary for her brother Herman's milling company in Comber, Ontario, Canada. Her mother's failing health would bring her home again in 1898. During the time of caring for her mother, her brother Morley returned home from Agriculture College and was pretty run down in health. So Rachel nursed her brother back to health. And it was during those months, that the siblings developed a plan to start their beekeeping partnership. It seems Morley was more accustomed to the bees. As a young boy, he remembered watching their father in the apiary and their father writing about bees in the 1890s. Young girls during this time were helping their mothers at home, so I doubt Rachael had much to do with helping her father with his bees and inventions. I'm sure her father felt everyone had their place in the family. The women kept house, the men farmed. The siblings would build their home and business in Georgetown, Ontario, Canada, where they would live and run their bee business. Rachael, being the artist, would give the home her decorating touches. Morley would have the ideal bachelor pad. The idea of women engaged in commercial beekeeping was not common then.

When a neighboring beekeeper was away from home for the Winter, Rachael was to manage the bees in his cellar. The beekeeper left instructions on how to regulate the temperature of the bee cellar. He instructed her on how to climb up and down the ladder and what to expect when entering a dark cellar full of beehives with bees buzzing around. All was

In the following cut we have an arrangement for accomplishing the same object. It is the invention of Mr. S. T. Pettit, of Belmont, Ontario. Mr. Pettit states, that during a bountiful yield he often extracts as often as once in three days; and when he gets a barrelful it is raised by means of a pulley to the top of his honey-room. The faucet of the barrel is then opened slightly, and a small stream of honey allowed to trickle upon a sheet of tin. The honey drips upon the edge of another sheet placed so as to be inclined in the opposite direction. From the lower edge of this sheet the honey drips upon the upper edge of the third sheet; from the third to the fourth, and in this manner it continues to flow from sheet to sheet, until it passes over about thirty, when it runs into a large vat. To prevent the honey from running off the sheets, the edges are turned up slightly. Mr. Pettit says he has never thought it necessary to run honey through the evaporator more than once.



PETTIT'S HONEY EVAPORATOR.

In California large shallow vats are sometimes used. The honey is left in these for a sufficient length of time exposed to the dry atmosphere and tropical sun of that climate. When it has attained sufficient density it is removed and put up in square cans.

Sylvester T. Pettit, Inventor,* ABC of Bee Culture *1888, pg. 102

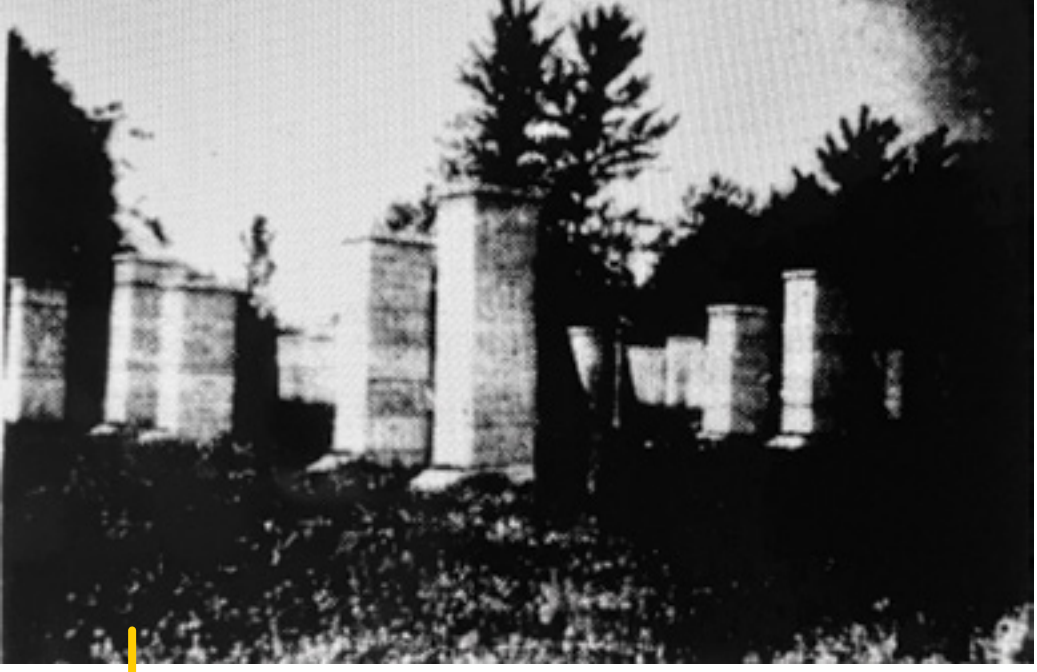
well if the bees were quiet. If they were roaring and sounded restless, they were too hot. If they buzzed slightly, they were too cold. She did her best, giving the bees what she felt they needed. And this experience would be her awakening as a beekeeper. Shortly after the cellar experience, Rachael was the provincial apiarist and during the first few years of her bee business things could have gone better. She was taking charge of what remained of the business, now managing the business part of the bees.

What remained of them after some colonies had been sold and some colonies died of neglect, was a hundred hives left. Rachael had no experience except the cellar and help of two young men who knew less than Rachael did about bees. She was all about the bees and realized that if this business was going to succeed, she needed to be more hands-on, even down to the fundamental knowledge of the use of the smoker, which came with practice. So, she needed to get more involved in their management. Her brother even tried to tell her what to do daily, but as Rachael would say, "instruction in practice without experience is dry stuff, and often words were not meant the way they sounded."

Here's a woman who just jumped into commercial beekeeping. Rachael admitted that during the first stressful days of learning to light the smoker, her fragile fingers were stung so much that she didn't even feel the stings. She soon realized it would take experience, perseverance, confidence and knowledge. Rachael's brother Morley basically said if his sister kept one apiary and caught swarms, her start in beekeeping would have been more leisurely.

We have all heard this before, but who wants easy. And this is just how Miss Rachael Pettit felt. She wanted more than an easy road, when a more challenging way meant higher achievement and rewards. From the start, she studied swarm prevention and went through her bees weekly and thoroughly, checking the brood and ensuring the hive had a queen.

The first year she got a fair crop of honey, and the results were satisfactory for a woman beginner. A



Pettit Apiary

modest crop of honey was harvested. Realizing that to make a real success of beekeeping, without a man's strength, she must keep enough bees to make it profitable to hire help.

In the middle of her first Summer in 1901, she purchased a second apiary of eighty colonies, an opportunity she could not pass up. The fact that this apiary was 150 miles from her home did not prevent the purchase, realizing it would be necessary to travel back and forth to care for the two apiaries.

Rachael purchased an automobile in the early 1900s; something she would find essential for her beekeeping business. She never cranked the extractor but she could occasionally crank the truck she drove for the first few years of her business. Rachael's use of an automobile and her management of three hundred some colonies of bees created a sensation with the local news that "the bee women had two automobiles and a team of horses." *American Bee Journal,* 1923, pg. 402.

The following year, the two yards were moved to within an easy distance of each other. In the second year, Rachael began to find herself as a beekeeper. Rachael and her brother Morley would soon learn how much work was involved in beekeeping. Rachael listened to what the others told her, not knowing what to do. It was as if she was working in the dark. So, by taking things into her own hands, she saw a door open before her eyes and knew she needed to learn every part of beekeeping before turning things over to the helpers.

Rachael took up queen rearing and made Doolittle's Scientific Queen Rearing the foundation of all her bee work. By experimenting and reading everything she could find about making queens, Rachael developed a system for raising and introducing queens. She was so successful that she was asked to give talks and teach her methods to the bee organizations.

From 1918 to 1922, Morley spent the next five years working in the bees with his sister realizing he needed to pay more attention to her beekeeping skills in the apiary. He was always too busy and didn't pay attention, mainly when it came time for the queens. He needed to learn more if he was to make a go at beekeeping. It was a true partnership every day and evening during the busy season.

Rachael had a real issue by letting the wholesaler have his profit on what she worked so hard to produce when it came time to sell honey. She tried many ways to advertise her products, selling directly to the consumer or retailer. Rachael was conservative and careful about spending her money on new methods. On the other hand, her brother was the opposite. He started selling packages in 1916, which he found very profitable. So the two maintained an understanding. And with her brother's help, a mail-order system was developed, which worked well. They were able to sell ninety-four thousand pounds of honey. She paid attention to the quality the production of the honey by separating it by color and flavor. Being the artist that she was, she created and put labels on the jars giving her customers that personal touch.

Rachael and Morley would take a Winter vacation to warmer weather in the United States in 1922. Sadly, upon their arrival, the two siblings were stricken with influenza and pneumonia, and both hospitalized. Rachael died in a hospital in Phoenix, Arizona at fifty-eight from pneumonia on February 26th, 1923. Morley recovered and returned home to Georgetown, Ontario, Canada, where he eventually married and became a professor. He would continue beekeeping and writing for *American Bee Journal* and *Gleanings in Bee Culture*, until his death in September 1945. Morley wrote a tribute about his sister Miss Rachael B. Pettit:

"One of the most successful woman beekeepers, Miss Pettit, never cared to pose as a "woman beekeeper." She was a devout and earnest Christian and active in all-good works. Although truly feminine, it was her desire to be a beekeeper among beekeepers, and as to how well she succeeded, her many friends in the beekeeping world will testify she was a wonderful woman."
—*American Bee Journal,* 1923, pg. 402 BC

Nina Bagley
Columbus, Ohio
Ohio Queen Bee

BEE ART *A Multisensory Installation*

M.E.A. McNeil

Beekeeper Jerome Draper pauses in the audio surround of a simple but moving art installation at the Headlands Art Center at the Golden Gate Recreation Area just north of San Francisco. The darkened room is filled with the sounds of bees. Credit: Jerry Draper

At the World War I-era military building that has become part of an arts complex, beekeepers Jerry, right, and his son Jerome exit the bee installation called "Semaphore." Credit: M.E.A. McNeil

The Headlands Center for the Arts "multisensory installation" called "Semaphore" turned out, after we asked around, to be found at the Center's gymnasium – one of several sign-free, World War I-era buildings, last painted by Doughboys and accessible over a chancy-looking foot bridge. We paused with a hand on the heavy metal door for a moment to let go of regret for the trip; after all, it was worth just the drive through the lush rolling coastal hills, just north of San Francisco across the Golden Gate Bridge. Such bee-art shows are often enough more hope than reward.

Entering was immediate and all-enveloping. There was no foyer, no docent, no indication of what was to come. We were in darkness, surrounded by the encompassing sounds of bees. The recording hummed on as our eyes slowly grew accustomed to the dark, and we became aware of rich, golden light glowing from eight tall windows. Looking up toward the eaves, a filmed loop of the enormous eyes of a beekeeper, lively with bees, stared down at us. We beekeepers felt as though we were inside a hive.

That was it, the whole installation. No posters of bee life cycles, no ghostly bee suits, no observation hive, no volunteer beekeeper to tell us that yes, they had been stung. But it was more than enough. The ambiance permeated our awareness. It was, to risk hyperbole, awe-inspiring. Less was more, just oneself inside the bliss of a buzzing box of bees instead of outside looking in. Wow.

The room was perhaps a quarter of the size of what we think of as a gymnasium, which we could see once we got our bearings. We didn't know how long we stood mesmerized before the outside door opened and two women entered. They grabbed each other in what looked like terror. Snapped out of our enthrallment, we took a few photos that we knew couldn't do an auditory experience justice and ventured down a very narrow set of wooden stairs.

There, on the first floor, next to two bowling lanes with hand-set pins

from the 1930s, sat a bored young woman at a desk, glad for some company. She explained that the upstairs piece was created by a beekeeping artist named Mark Thompson for the 40th anniversary of the first cohort of artists at the Center. As it turns out, in the 70's, when artists were invited into the old military buildings that had been turned over by the Army to the National Park Service, the gym was inhabited by several beehives. Thompson, in the narrative of the young woman at the desk, "tamed them." As beekeepers, we interpreted that to mean that he hived them.

What developed from that was an artistic oeuvre, as such things are called, which was Thompson's film "Immersion" of 1973-76, which he called "a way for me to visually explore the unique spatial qualities of the honey bees in flight, this curiously fundamental particle space and energy field created when thousands of bees are mingling in the sky." Unfortunately, that footage was not to be found. Perhaps we'd just as soon see the real thing by going into our apiaries, but that's just us.

A grainy black and white film from 1987 is available showing his collaboration in the same gym space at the Headlands Center with dancer Joanna Haigood of the Zaccho Dance Theatre, called "The Keeping of Bees is Like the Directing of Sunshine." It is billed as "integrated architecture, dance, light, scent and the flight of the bees."

In the film, four towering beehives, stacked nine and ten supers high, are placed at the end of the darkened gym with live bees coming and going from one sunlit window. Thompson, as a veiled beekeeper, lights a smoker and removes some supers filled with frames. The background sounds are those of the bees and, incidentally, a young child in an unseen audience. Thompson removes one stack of empty boxes, one by one, to reveal a white-leotard-clad dancer inside. A nice surprise. She steps out and approaches the window, framing her hands around the ray of sunlight amidst the transiting foragers. The dance piece was intriguing to watch, but it did not transcend Thompson's recent, simple installation of sound and filtered light that placed the viewer inside a hive.

A room that served as a small gymnasium over two world wars has been enlivened by the sound of bees by the artist Mark Thompson. His eyes look down from a filmed loop like a beekeeper peering into a hive, giving the visitor the sensation of being inside it. Credit: Jerome Draper

The young woman at the desk explained that the glowing gym windows were covered in beeswax. We went back upstairs to run our fingers over them and discover that they were indeed covered with fabric dipped in amber-colored beeswax, each intriguingly different. The two women had fled.

For those of us attempting to communicate, by one means or another, the wonder of keeping bees, this simply conceived exhibition delivered a depth of feeling that went beyond actions or words. BC

The ambient light in the installation comes through windows covered with fabric dipped in beeswax. Credit: Jerome Draper

A Sting Operation at the Maine State Prison

Jane Dunstan

Originally published in the August/September 2023 issue of *The Bee Line*

While giving a tap room talk on honey bees for The Farmer's Lyceum speaker series at the Pour Farm in Union last Summer, I was approached by a woman carrying a bottle of honey. She stated she worked with several beekeepers at the Maine State Prison and when she heard I was speaking, came bearing a gift from the beekeeping residents. What ensued was a conversation regarding her work with them, specifically around offering beekeeping education and assisting with management of their hives. I expressed a desire to visit and interview the men who were keeping bees for an article in *The Bee Line*. We exchanged contact information with plans to reconnect in the Spring and establish a time for visitation. Those plans came to fruition this Summer.

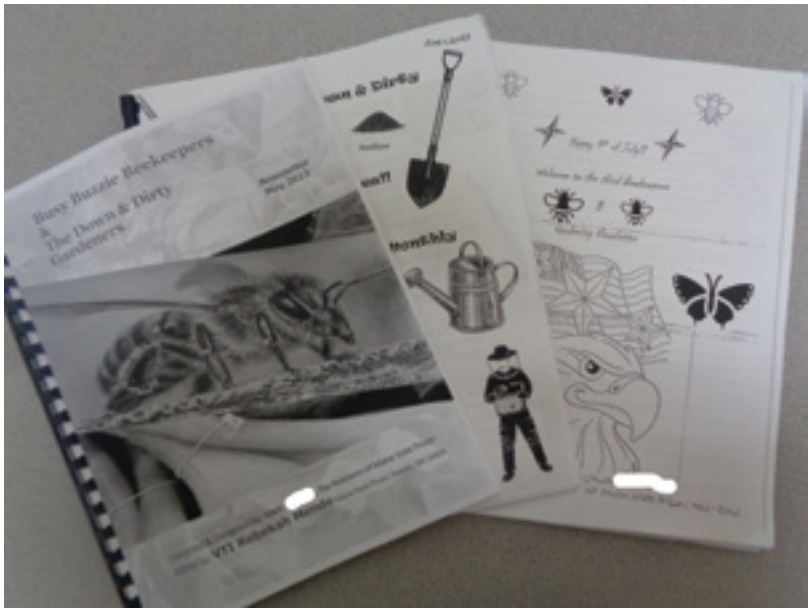
Prior to scheduling a visit to the prison, it was necessary to complete credentialing requirements and training for volunteers. Upon entering the prison with only my keys, license, a writing pad and pen, I registered and waited for an escort to arrive. Rebekah Mende, the vocational trades instructor (VTI), the same individual who reached out and attended the talk a year prior, met me in the waiting area and explained the process of entering the heart of the prison. While walking to our destination, Rebekah reviewed some statistics and protocols regarding the prison. This maximum security prison has the capacity for 1,100 residents, however currently houses 800 men along with 400 staff including day/night shifts, security, support staff and contracted professionals (medical and mental health staff). While incarcerated, residents refer to each other by their last name to create distance, however with visitors, they utilize their first name or first initial only to identify themselves. I was not permitted to bring in a cell phone, tablet, record the interview or take photos. All photos in this article were taken by Rebekah or someone she designated. As we meandered down hallways and across the community grounds, I noted how beautifully landscaped the area was with both flower and vegetable gardens. Residents complete master gardening and horticulture programs as well as beekeeping if they so choose and volunteer to work in both the gardens and the hives. Of the food grown, 80% is utilized at the prison and 20% is donated to food banks in the area.

Programs offered to residents include the five week beekeeping program and the master gardener program with its greehouse as its hub. The facility recently became registered as a monarch waystation. Residents find the larvae, put them in cages awaiting their maturity to caterpillars and finally as butterflies. At that time, they are tagged, released and tracked.

To date, 88 residents have gone through the five week beekeeper program. Currently, there are 53 beekeepers involved in varying degrees of participation. "I realized I don't have to be the expert; my goal for the program is to have residents become the experts in keeping bees" states Rebekah. This year, they started the beekeeping season with eight hives. Two of the hives, which began as packages, are struggling. Last year, construction of stone pads for the colonies was begun with the hope to finish them this year, along with installing a wind break and elevating the hives further off the ground.

The fruits of their gardening labors were readily apparent as we approached the area where the beekeepers were waiting. With the greenhouse as the backdrop along with carts of watering cans, wheelbarrows and garden tools, I took a seat at the picnic table and was introduced to the beekeepers by first name prior to the start of the interview. They talked informally about how they try to get into the hives on a weekly basis and are now working hard on trying to raise a queen after adding extra frames of eggs and brood. Shaun discussed how he searched for the perfectly aged larvae and lots of eggs in a frame, placed it in a nuc with extra bees figuring "they have to make something!" He spoke of the collective discouragement of the beekeepers this Spring when hive eight was the only overwintered colony out of nine colonies. "We are ready to do *varroa* mite treatments after seeing serious wing deformities in the bees. They are struggling."

I began the interview with the question of whether anyone had prior experience with bees before becoming residents at the prison. Kevin had no prior experience and Shaun, who is in his second year keeping bees, had no previous experience but "tore apart every book on beekeeping I could find." Henry, although new to beekeeping, was not new to agriculture. "When I leave here, I'm going back to the farm to keep bees. They are so important for pollination and gardening." Jerry took the class in 2018 and has been a beekeeper for five years. He stated "as soon as you open a hive you're hooked." Jeff had no previous exposure to bees but reiterated "it



is a great little program; it's neat to learn and handle everything." Chris, a third year beekeeper, first became involved in the gardening program and then realized the connection with pollinators which "inspired me to look at beekeeping." F is a first year beekeeper with no prior beekeeping experience or interest. "I took Mende's botany class at UMA and that put me back into flowers and plants. I wanted to learn as much as I could so I took the beekeeping class." Colin was introduced to beekeeping in 2021 when the editor of their newsletter asked him to do the artwork for an issue. He created a bee comic strip which he was able to do after learning about bees. Danny commented "I didn't want to sit around doing nothing. I wanted to fill my time with something purposeful. Becoming involved with the bees has helped me build coping skills and ideas for the future that I can put into my toolbox for when I start my life outside." Mark, the editor of the beekeepers newsletter, said "I had friends who had bees and I was always interested."

Nadim, who was unable to attend in person, did respond in writing about the benefits of the program. "As someone who took Mende's beekeeping class last year, I can attest to the benefits of the program. It provides valuable vocational training and has a positive impact on the mental well-being of participants by reducing stress levels and improving relationships among incarcerated citizens and staff members. Beekeeping classes instill in us a sense of self worth and responsibility and offer numerous benefits to society. By learning the craft of beekeeping, we develop new skills and confidence that we can utilize once we leave prison, leading to employment and a reduced likelihood of re-offending. The beekeeping program at this prison is an excellent example of the benefits of quality educational programs, essential for successful reintegration into society. Educational and vocational programs like these are proof that we can use education as a means of transformation, even in challenging environments." Greg responded "I'm blessed to be one of the original people who took the beekeeping class in 2017. We started with a few packages, dug into the hives weekly and it was always exciting and fun." Rebekah chimed in "he has the Midas touch; he can spot a queen five yards away." A retort of "it's the only reason we keep him kicking around" followed, at which point Greg quipped, "Can you feel the love?" He shared a story of when he first got suited up, taped his ankles and wrists and when asked whether he was ready, stopped dead in his tracks and sheepishly uttered "I gotta pee."

The men were reflective when asked what has amazed them the most about keeping bees. Greg commented first. "You go in, put in a frame of foundation, go back and find they have drawn out the foundation with wax, then the queen goes and lays eggs and you find all this brood and then they jam the cells with pollen and nectar.

Last year we just put in a bar and it was cool to see the bees pull down three little 'dippity dos' of foundation on their own. It's just watching nature."

Richard stated "the first thing I notice is the smell of the hive." Kevin replied "I'm a man of God and it amazes me to watch God's creatures be so obedient and know what to do. No one has to guide or lead them."

Henry said "I've never been scared. Being in the hives makes me realize how gentle and forgiving they are... that is so amazing to me." Shaun stated "the thing that amazes me the most is their ability to survive anything and pass on their genes. If the hive goes queenless, they have the ability to know what is needed at the time." Jeff remarked that he is astounded by the whole process; "how these little creatures can handle all their business; start off with nothing and get honey in the end. They just kill it!" Danny was surprised by the difference in the taste of natural honey versus store bought honey. "I've been lied to! The stuff you buy in the store isn't honey! He was also cognizant of the effect bees have on the community of beekeepers at the prison. "It has taken on a spirit of its own and has brought us closer together as a community. There is talk of it all the time." F shared that "bees impact us; people who never talked to each other before now have something in common." He was also astonished that after all the grounds are mowed, the bees can still find food. John was touched most by their nature, creating life and being a conduit to the further progression of plants and their part in the world." Colin felt they were important to the world in general. "If there were no bees we would struggle to survive." Mark was moved by their work ethic. "If an animal, like a skunk, comes in and damages their comb, they repair it. We come here... don't have anything... but work toward something... and eventually have everything we need. Bees are the same way; they start off with nothing, then create cells which they fill with honey, food and eggs. They work their tails off... just like us."

The question of what has been the most difficult aspect of keeping bees elicited a number of responses which the group could collectively agree upon. Mark began the discus-

sion stating "watching us lose them. We work so hard to keep them alive. We started with one, got seven new ones to make eight and then found out only one survived." Greg said "it's hard when you overwinter them and take the cover off in early Spring, find the hive alive and then two weeks later, the hive is dead." When we talked about possible culprits which may have resulted in the dead outs, they identified mites, small cluster size and cold as the three main causes. We discussed Winter bees and the importance of treating for mites which prompted many questions about thresholds and miticides. When the targeted discussion resumed, Henry shared the most difficult thing for him was "not being able to be in the hives more often; having such a hands off approach to them. I so want an observation hive." Shaun felt location has been difficult in that "we have to rely on other people to get out to them. Trying to help a struggling hive survive with limited resources in terms of bees and brood is tough." Danny felt the hardest thing was waiting for the honey to be ready to extract and the sheer amount of information you need to know.

The beekeepers were asked whether they would like more educational opportunities regarding management of their colonies. Henry was eager to say "I would love an advanced beekeeping course, have a hands-on queen rearing course and have more knowledge in general. I have read every back issue of *American Bee Journal* and *Bee Culture* that we have and I've ordered books." Shaun stated "I would like to work with Mende to create an advanced beekeeping class and after three years, try to get a master beekeeping certificate through Cornell here on grounds. I want to take a couple of hives and learn how to make queens. We already have a three part mating nuc, grafting bar and Chinese grafting tool. Now to get to the next step. I really want to rear queens and produce enough queens to help people in the area. Cornell has a special rate for prison residents which is $500 and has adapted a model to work inside correctional settings. They are willing to accept a video tape of a hive inspection. We don't know how we are going to pay for it yet though." When asked if they could use proceeds from honey sales, Shaun indicated they don't sell any honey. All the honey which is extracted goes to the beekeepers in the program, staff and the kitchen. Greg has a lot of interest in top bar hives and wishes to learn more.

In conclusion of our time together, I asked them what their personal goals were with beekeeping. Henry wishes to return to the farm where bees will be an integral part of his life there. Mark wants his daughter to have bees instead of a puppy and plans to implement that once he walks out of the prison doors. Shaun not only wants to become a master beekeeper but desires to "help Mende train up the next group of beekeepers to be the best we can be, get all the hives through Winter because we did everything right." Shaun spoke about how "beekeeping gives him a purpose; I love teaching and learning. It gives me the opportunity to pursue something and not get lost down a rabbit hole. It makes my brain happy to try new things." Henry said "bees give me a sense of community. Everything you do in this prison, every group you are involved with expands your experiences and changes the climate. The more people who get involved, the kinder and gentler the environment becomes." Colin felt that working with the bees will continue to influence his artistic abilities. Mark shared "it keeps me motivated, opens my eyes to different things I've never experienced before. We can call it "ours". It has definitely changed me."

As we walked to the apiary to see their hives buzzing with activity at all the front entrances, they were eager to talk about the different colonies and the issues intrinsic to each of them. I was given a tour of their newly organized storage area which

they had proudly worked on a few days before. Feeders, supers, honey buckets, frames, woodenware and insulation for winterizing all had their designated areas for easy access.

While strolling back to their main work area, I asked them what their needs or wants were at this point in their beekeeping journey. Their responses included:

- someone to teach them about queen rearing and grafting
- more educational opportunities with guest speakers
- an observation hive so they could watch bees throughout the year

For anyone who has a desire to spend time with these beekeepers or has an observation hive, large or small that they wish to donate, please contact me at **rm-llamas1@gmail.com.**

The beekeepers were most appreciative of the visit and interview. I found the experience both humbling and insightful. Several of their responses touched me as well as the parallels they drew between the bees and themselves. Not knowing what to expect initially, I would return in a heartbeat to work with them in their hives and spend time in the classroom both teaching and learning from them. BC

Originally published in *The Bee Line:* **https://maine-beekeepers.org/the-beeline/**

Meet Gary Brown

By Bev Berens

Blanch and Gary Brown (Photo Credit: B. Berens)

Gary Brown of Vermontville, Michigan, has a passion for teaching. When he started beekeeping just six years ago, he added another passion to his persona. Beekeeping and teaching easily converged and Brown is now teaching beekeeping at VFW posts under his command as the District 8 Commander as part of the Heroes to Hives program. He will soon begin teaching the subject at the VFW National Home in Eaton Rapids, Michigan, primarily to youth residents living in the community.

Brown entered beekeeping after watching his wife and high school sweetheart, Blanche, purchase gallons of honey over the years. "I eat raw honey every day," he said. He rotates through his Spring and Summer varieties, along with some specialties like blueberry and buckwheat honeys. Blanche is the local VFW Auxiliary president.

After twenty-one years of active military service in the Army with tours in Vietnam, Korea and Germany, Brown retired as a staff sergeant, attended college, received a master's degree, and spent the balance of his working years in human resources. Since retiring from civilian work, he completed the Heroes to Hives beekeeping program and is the second Michigan graduate of the Great Plains Master Beekeeping Program at the University of Nebraska-Lincoln. This achievement gives him the credentials to professionally mentor others working through Heroes to Hives and the Great Plains Master Beekeeper training programs.

Helping people achieve in-the-moment focus and leaving behind trauma and burdens carried by many veterans and their families is one of the most satisfying pieces of Gary's beekeeping journey.

Heroes to Hives

Let's Talk Lifts

Bev Berens, Adam Ingrao, Heroes to Hives **& Ned Stoller,** Michigan AgrAbility

Figure 1. Honey supers need to be moved individually for maintenance and management at every inspection. (Photo credit: A. Ingrao)

(Note: Any products or brand names noted in this article do not constitute a recommendation for the product or brand. Authors are not paid agents of any brands, makes or equipment mentioned in this article.)

After a day of lifting and moving hives, every body part aches. Unfortunately, the aches and pains only intensify with age and injuries, compounded by the truth that an older body requires more recovery time.

As colonies grow over the season, so do the demands for lifting heavy honey supers individually to get to the brood chamber for inspections and management (Fig. 1). Hive lifters are a way that mechanical ability is used to compensate for the physical strength needed for moving hives and hive bodies individually. The right hive lifter can make a hard day's work easier for anyone. It can also open opportunity's door to potential beekeepers with disabilities, who may perceive that beekeeping is not an option for someone in their position.

That belief is false. Wheelchair users, amputees, people with back, shoulder, knee and joint impairments can find tools to help them start or continue tending bees, and there are ways to adapt the work to the impairment. Organizations like AgrAbility specialize in supporting individuals with impairments. An on-farm assessment examines the tasks and tools an individual has in their possession and recommends methods, tools and strategies to work with each person's situation to help them do the job with less physicality. AgrAbility also hosts a virtual assistive technology toolbox for beekeepers that helps identify tools that may help specific impairments (**http://www.agrability.org/toolbox/**). Those same tools and methods can also aid someone who may be able to do the work but suffers painful consequences and medicates with pain relievers after a day of heavy lifting.

Hobby and sideliner beekeeping has experienced incredible growth during the last decade, especially within the veteran community, thanks in part to programs like Heroes to Hives. Veterans have a strong desire to continue

Figure 2. Gary Brown with homemade individual hive body lift. (Photo credit: N. Stoller)

Figure 3. Individual hive body lifts allow you to lift from any hive body level to make inspections and management easier. (Photo credit: N. Stoller)

serving their nation following military service. Agricultural endeavors like beekeeping offer a unique opportunity to fulfill that desire. Veterans carry the physical and mental traumas of service with them, long after service ends. Many have found beekeeping to be a pathway to personal and financial wellness. Beekeeping can provide the fulfillment of livestock care and farming, is available to someone with limited capital and land access and is an ag sector brimming with tools to compensate for a wide range of physical impairments.

"Hive lifters can really reduce the physical part of moving hives, or they can bring them up to a more ergonomic height when you are bending over and inspecting them," Gary Brown said. Brown, an Army veteran and beekeeper in Vermontville, Michigan, has been collaborating with Ned Stoller, Assistive Technology Professional, and agricultural engineer with Michigan AgrAbility to develop a do-it-yourself hive lifter (Fig. 2). "A deep frame box full of honey might weigh around one hundred pounds in a single box. You've got to be in great shape to move that, and if you don't use those muscles all the time, you really suffer after you come in for the day. A lifter uses your weight for momentum, and you can just move the hives wherever you want without carrying."

Beehive lifts can be split into two general categories—whole-hive lifts and individual hive body lifts. Whole-hive lifts are simpler and more economical but have more limited functionality as they only move complete hives. The tilt and roll action of a simple, heavy duty hand truck with extended forks requires a ramp to roll hives onto a trailer or truck bed. All-terrain tires are helpful to operate in all types of ground conditions. Hives moved with this type of tool should have a solid bottom board and cleats that are two inches off the ground so the dolly can be inserted under the hive before tilting and rolling to a new location.

Hand hold dollies are whole-hive lifts with spring-loaded tongs that slide into the hand holds on both sides of the bottom hive body. Pull the dolly handle back and the bottom hive body can be used to lift the entire hive. This method accommodates screened bottom boards and has multiple uses, from moving whole hives to material handling when moving full honey supers into the honey house for extraction (**https://www.mannlakeltd.com/extracting-bottling/honey-bottling-equipment/ez-lift-hivetruck/**).

Costs for either option vary, but a person could expect to spend between $400 and $800.

Individual hive body lifts can grip a hive body at any height, allowing for separation of hive bodies at specific locations for inspection and management, an attractive feature for someone with mobility and lifting restrictions. Removing heavy honey supers for managing and inspecting the brood chamber is simplified with a lift. Individual hive body lifts dramatically increase accessibility, limit possibilities of secondary injuries and eliminate manual lifting of the honey supers (Fig. 3).

A two-person hive lift splits the weight by sharing the load. Handles on both sides of the hive compress around the hive body and can then move either individual hive bodies or whole hives. The handles are lowered around the hive, then, as they are lifted by the team, the compression grips the hive and raises it. This low-cost accommodation divides the weight of the hive in half. The drawback is that the operation is now a two-person job.

Some individual hive body lifts such as the Kaptar Lift can move entire beehives or lift individual hive bodies. The power lift assist mechanism can be either hand crank or electric, and the electric versions also feature a power assist transmission to move the lift from one location to another. Once tilted against a hive, the grip pads are raised to the desired hive body, then squeezed into place with a locking compression lever to grip the hive. Once secure, the entire hive can be moved and placed onto a trailer or vehicle without manual lifting. During regular inspections, the lift can be used to isolate the brood chamber by allowing the user to select the desired brood chamber hive body as a lifting point. This allows beekeepers to inspect and manage colonies without lifting honey supers (Fig. 4). "It lifts up like an elevator and it drops it down so you can actually lower this from a truck bed down to the ground," Brown said. "And once you're on the ground, you roll it back in and bring your load back down. It's really cool."

Older models of this brand have a narrow wheelbase which leads to an unstable load when the hive is lifted and moving over rough terrain. The newest version has a wider wheelbase with greater stability. One drawback of the electric Kaptar lift is the length of battery time—a four-hour window of operation followed by a six-hour

Figure 6. Having hives spaced three to five feet gives the hive lift operator space to move the lift easily around an apiary (Photo credit: A. Ingrao)

charging period according to catalog specifications. This may be enough working hours for a hobbyist, but sideliners may need a longer and faster charging time for the investment to make sense. Naturally, the electric powered option comes with a larger price tag than manual options for individual hive lifts.

Smaller versions of truck mounted cranes used by commercial apiaries can be useful to the sideliner and some hobbyist beekeepers. Manual or electric cranes are readily available and can mount to a pickup bed, utility trailer or attach to a tow hitch (Fig. 5). Hive gripping attachments on the crane are challenging to locate. The attachment needs to lift so that the crane cable is centered over the top hive to maintain the hive's balance while in motion. A homemade version could cost as little as $500 and purchased models can easily surpass $3,000.

Stoller has designed a manual version of an individual hive body lift that mimics the operations of a power lift but uses mechanical action like a hand crank for lifting the forks in place. Brown has been testing the prototype with his hives while Stoller continues to tweak the design.

Figure 5. A hitch mounted crane lift easily moves full hives and hive bodies. (Photo credit: A. Ingrao)

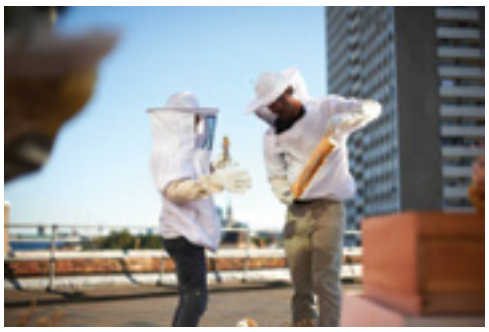
"We are close with this latest version," Brown said. "But it's still a little bit bulky and awkward."

Wide tires versus narrow tires impacts maneuverability. Smaller, narrow tires improve maneuverability and ability to pivot, but require much energy and strength. A larger tire reduces the maneuverability but requires less handling strength.

Another consideration when placing hives is finding a level location. No matter if the hand cart or dolly is electric or manual, forks are inserted under the hive at the same elevation or grips are aligned on a level plane. Hives resting on a slope have points of entry at different elevations. The greater the slope, the greater the difficulty in securing hives on the lift. Hives should be spaced appropriately for the given hive lift but in general, keeping three to five feet clear in all directions will make operation and maneuverability of hives on lifts easier (Fig. 6).

Hive lifters can offer options for beekeepers with lifting or mobility restrictions. Safety and accessibility are improved when heavy lifting and hive moving is reduced. The industry continues to see growth from many sources, but beekeepers and potential beekeepers can be hampered by impairments that make using traditional Langstroth equipment challenging. Alternative hive styles are an option for some beekeepers and will be discussed in a future article. People who prefer the Langstroth style have options to make the equipment more ergonomic and accessible with hive lifts. BC

Figure 4. Lifts like the Kaptar Lift make moving hive bodies for varroa mite monitoring and applications of miticides easier on the beekeeper's body. (Photo credit: A. Ingrao)



As urbanization continues to encroach on natural habitats, the role of urban beekeeping has become increasingly important in promoting pollinator health and sustainable agriculture. In this article, we will explore the benefits and challenges of urban beekeeping, featuring interviews with urban beekeepers and experts in the field, as well as case studies of successful urban beekeeping programs in different cities. We will also provide practical tips and resources for those interested in starting their own urban beekeeping operation.

Urban beekeeping offers numerous benefits, both for bees and for humans. For bees, urban areas can provide a diverse range of forage options, such as gardens, parks and green roofs. Urban beekeepers can also help to increase the availability of forage by planting bee-friendly plants and encouraging others to do so as well. In addition, urban beekeeping can help to reduce the negative impacts of pesticides and other toxins on bees, as urban areas tend to have lower levels of pesticide use than rural areas. Finally, urban beekeeping can help to promote biodiversity in cities, as bees are important pollinators for many plants and play a critical role in maintaining healthy ecosystems.

For humans, urban beekeeping offers a range of benefits as well. First and foremost, it can provide a source of local honey, which is often of higher quality and more sustainable than honey produced by large-scale commercial operations. In addition, urban beekeeping can serve as a powerful educational tool, allowing people to learn more about the importance of bees and the role they play in our food system. Finally, urban beekeeping can provide a sense of community and connection to the natural world, as people work together to care for and protect these important pollinators.

To learn more about the benefits and challenges of urban beekeeping, we spoke with several urban beekeepers and experts in the field. Dr. Christina Grozinger, a professor of entomology at Penn State University, emphasized the importance of providing forage and minimizing pesticide exposure in urban beekeeping operations. “Urban beekeepers need to be aware of the types of plants that are available in their area, and make sure that there are enough resources for the bees to feed on throughout the year,” she said. “They also need to be aware of potential sources of pesticide exposure, such as nearby agricultural fields, and take steps to minimize that exposure as much as possible.”

Chris Harp, a beekeeper in Chicago and founder of the organization Chicago Honey Co-op, emphasized the importance of building community partnerships and working with local organizations to promote urban beekeeping. “We work with a lot of community gardens and urban farms to set up beehives and provide education and resources,” he said. “It’s important to build these partnerships and work together to create a more sustainable food system and protect our pollinators.”

To get a closer look at successful urban beekeeping programs, we also spoke with beekeepers in several cities. In Philadelphia, the Philadelphia Bee Co-op is a community-based organization that provides beekeeping education and resources to urban residents. The co-op manages several beekeeping sites throughout the city, including on rooftops and in community gardens. According to co-founder Kerry Boyce, the co-op’s mission is to “promote a more sustainable, healthy and just food system through urban beekeeping and education.”

In New York City, the Brooklyn Grange is a rooftop farming operation that includes several beehives as part of its operation. The Grange produces a range of fruits, vegetables and honey, and also offers educational programs and tours for the public. According to Grange co-founder Anastasia Cole Plakias, “Our goal is to create a more sustainable, equitable and delicious food system by producing food in the heart of the city and empowering our community to con-

Case Studies of

nect with their food and the people who produce it."

In addition to the benefits and success stories of urban beekeeping, it's important to be aware of the challenges and potential risks as well. Urban areas can be more prone to pests and diseases, which can spread quickly through bee colonies if not managed properly. In addition, urban beekeeping operations may face zoning and regulatory challenges, as local regulations can vary widely and may be unclear or inconsistent. Finally, it's important to be aware of potential safety concerns and take steps to minimize the risk of stings and other hazards.

Despite these challenges, urban beekeeping has become increasingly popular in recent years, as more people become interested in sustainable agriculture and protecting pollinators. If you're interested in starting your own urban beekeeping operation, there are several key factors to consider. First, you'll need to find a suitable site for your hives, such as a rooftop or backyard. You'll also need to choose the right type of bees and equipment, and learn how to manage pests and diseases. Finally, you'll need to be aware of local regulations and zoning requirements, and take steps to minimize the risk of safety concerns and negative impacts on neighbors.

To get started, there are several resources available for aspiring urban beekeepers. Local beekeeping associations and clubs can provide education, mentorship and networking opportunities, while online resources such as *Bee Culture Magazine* and the American Beekeeping Federation can provide valuable information and advice. By working together and sharing knowledge, urban beekeepers can help to promote pollinator health, sustainable agriculture and healthy, vibrant cities for generations to come.

Bees are crucial to the health of our ecosystem, as they are responsible for pollinating a wide range of plants that provide food for both humans and other animals. Bees also play an important role in maintaining the biodiversity of our environment, as they help to spread the pollen and seeds of many different plant species. However, in an urban environment, the availability of plants can be limited due to the prevalence of concrete and asphalt.

The lack of plant-based environments in urban areas is a significant challenge for beekeepers, as bees require a diverse range of flowering plants to provide the nectar and pollen they need to survive. Without access to a variety of plants, bee colonies can struggle to find the nutrients they need to produce honey and maintain their population. This can lead to weakened immune systems and increased susceptibility to disease and parasites.

One way to address this challenge is to focus on planting more bee-friendly vegetation in urban areas. This can include a wide range of plants, from flowers and shrubs to trees and even vegetables. By providing bees with a diverse range of plants to forage on, beekeepers can help to create a more sustainable environment for their bees.

However, planting bee-friendly vegetation in urban areas can be challenging, as there is often limited space available for gardening. In many cases, beekeepers will need to get creative with their planting strategies, using techniques like vertical gardening, container gardening, and community gardening to maximize the space available.

Another important consideration when it comes to urban beekeeping is the quality of the plants available. In many urban environments, plants may be exposed to pollution from sources like cars, factories and other industrial activities. This can have a negative impact on the health of the plants and the bees that rely on them.

To address this challenge, beekeepers may need to focus on selecting plants that are particularly resilient to pollution and other environmental stressors. They may also need to take steps to protect their plants from pollution, such as using covers or other protective barriers.

Finally, urban beekeepers may also need to take extra precautions to ensure the safety of their bees. In densely populated urban areas, there may be a higher risk of vandalism, theft or other forms of harm to the bees. Beekeepers may need to take steps to protect their hives, such as using secure fencing or placing their hives in more secluded areas.

In conclusion, urban beekeeping can be a rewarding and fulfilling hobby, but it does come with some challenges. The lack of plant-based environments in urban areas can make it difficult to maintain a healthy and thriving bee colony. However, by focusing on planting more bee-friendly vegetation, selecting resilient plants and taking extra precautions to ensure the safety of their bees, urban beekeepers can help to create a more sustainable environment for their bees. With the right strategies in place, urban beekeeping can be a powerful tool for promoting the health and well-being of both bees and humans alike. BC

Michael Groover

Successful Beekeeping

Check your mailing labels! Next to your renew code are your remaining issues left. We suggest renewing if you have 3 or fewer!

www.BeeCulture.com

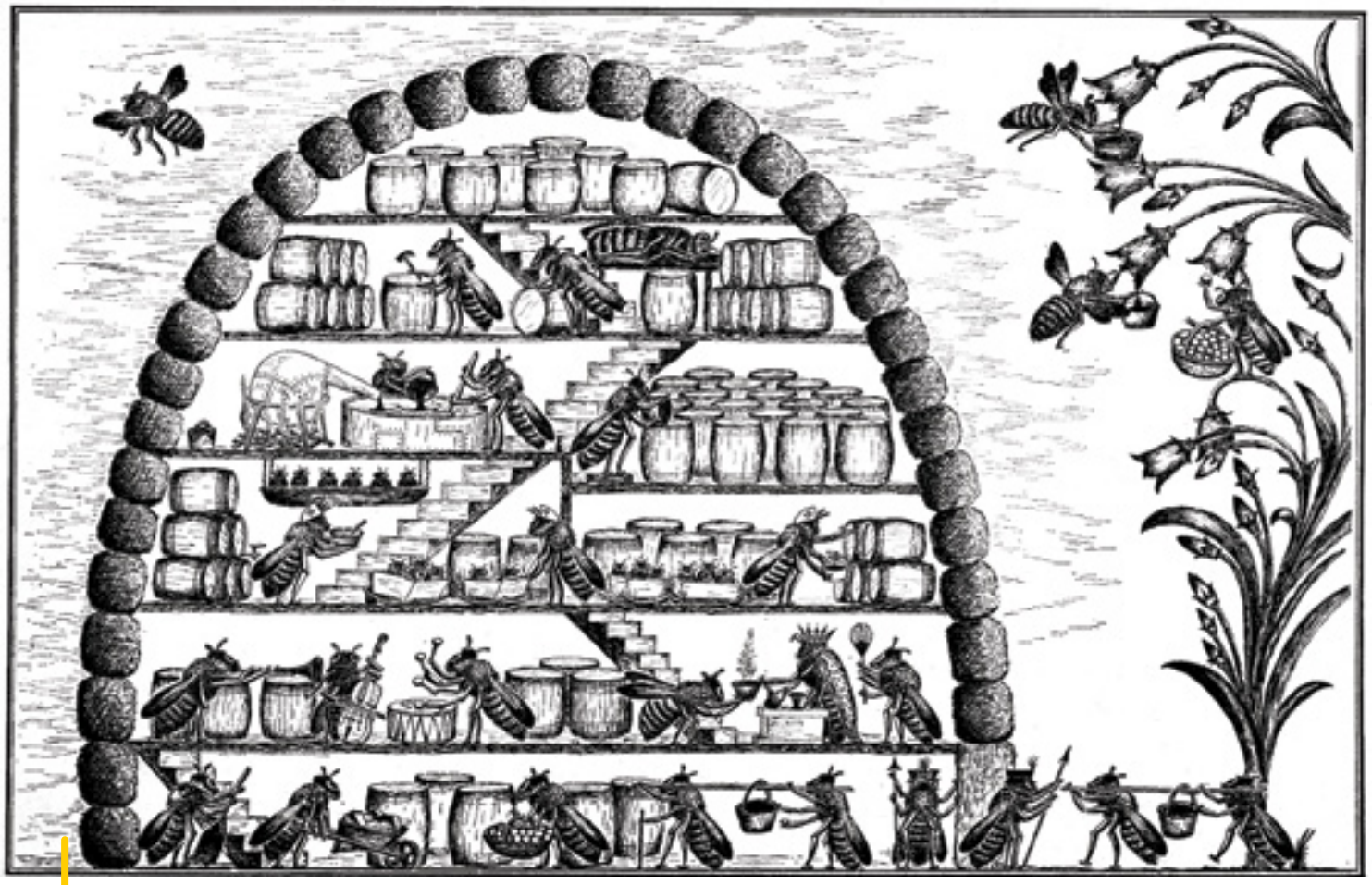


Image from Gleanings in Bee Culture, *July 1932*

Politics of the Hive

Peter L. Borst

Foreword

Over the centuries, people have endlessly debated the proper forms of governance and often they have compelled us to look to honey bee society for inspiration, guidance and amusement. I suppose it's the ultimate irony, that early on men noticed the "big bee" and declared that "he" must rule the hive, much like an Egyptian pharaoh or a Roman Emperor. In the course of my reading, I stumbled on an obscure essay in a forgotten journal. Being written a full one hundred years ago, the language was at times awkward, odd and even obscure. So I have taken it upon myself to update it to make it accessible to the modern reader. Hence, I call it:

Honey Bee Socialism

People are biased; like most other animals except the dog, we judge all other creatures by their usefulness to us and their intelligence by their subservience. Nine out of ten exalt the intelligence of the dog above the cat, not realizing that their judgment is highly skewed by the personal equation. They are actually placing *extreme servility* above a fine sense of independence.

They think the dog is the more "intelligent" of the two because the dog does what they want and even seems to enjoy it. They call the cat less "intelligent" because the cat does what the cat wants, and doesn't give a damn about their opinion as long as they aren't throwing stuff around the room. The dog, like the willing apprentice, fawns on his keeper; the cat, with much more political savvy, keeps her eyes on the cook. By the delusional family, the dog is judged to be the wiser one, which is obviously absurd.

But nowhere is this human folly more obvious that in our attitude towards bees. We consider its sting and its mercurial disposition, but these drawbacks are forgotten in favor of the image of the bee as an expert at candy and candles, the producer of those two wonders, honey and wax. This makes it irresistible to us, with the result that the bee is elevated by pastors and politicians to an object of admiration instead of the deplorable example she really is.

It's hard even to discuss the intelligence of the bee, because whatever it is, the intelligence of insects is so utterly different from our own. There is no common ground between us and while we might someday exchange ideas with the inhabitants of other planets, we won't ever do it with our own insects. Their entire thinking—that is, if they can think at all—is arranged so differently from ours, and their anatomy is so unlike ours that all we can be sure about them is that between their mental process and those of all animals, including us, there is an impassable gulf. The universe as they experience it must be entirely different from the one we know. This is shown by the odd combination of actions that appear to demand reason of a very high order, or at least a very sophisticated form of instinct, side by side with the almost incredibly stupid things they often do.

For lack of a better word, let's agree to discuss the "intelligence" of the bee. Some people would not even judge it quite so high as that of ants, which keep pets and livestock, but they are still pretty smart and so the bees have a right to claim an exalted position in the insect world. Her patriotism is intense, her social dedication is far more highly developed than ours—though when it breaks down, it really goes to hell—but the ingenuity with which she has solved certain problems of sex and mathematics is topnotch. We all know the three shapes the triangle, the square and the hexagon, can be packed together without gaps. Of these, it is the hexagon, the shape adopted by the bee for its cells, which is quite the strongest and the most economical in terms of labor and materials.

So far I have been praising the bee and you might wonder why I should point out what most people already know. I guess it's only fair to say a few words in her favor before I really go on the offense. Let us look now at the case *against* the bee, a case which like those of other criminals, is not made weaker by the evidence of intelligence on her part. The bee is the most perfect example of Socialism in the world. The thoroughness with which she has carried out her principles leaves Karl Marx and the rest of them in the dust. I suppose the ancestral bees lived the ordinary insect family life, because their customs are more highly advanced than savages. How the rebellious daughters managed to acquire all the power for themselves, or why they rebelled, we will probably never know. Maybe they formed some sort of hymenopterous labor union. However they did it, and whatever the reason, they sure enough did—and the family turned into a strictly Communist State. Individualism was once and for all rejected by the honey bees. The life and happiness of the individual bee is nothing, and the success of the hive became not only the main thing, but the only thing they care about. I suppose there is a certain beauty to that, how the architects of this plan succeeded in perfecting it in practice.

Once started down this path, the bees found themselves in the grip of a logic as remorseless as that of Chairman Mao, and what a rut they're stuck in now. Maybe the weirdest part is their sex lives. Working for the hive is the only thing worth doing, and sex being basically a royal pain, they decided to get rid of it as much as possible. This was done so thoroughly that in the worker bees, which form the bulk of the population in a normal hive, the sex organs have been almost completely lost. The first consequence of the establishment of the New Regime was to force 99 bees out of 100 into permanent sterility, which from the point of view of the individual bee must be, *one would think*, somewhat regrettable.

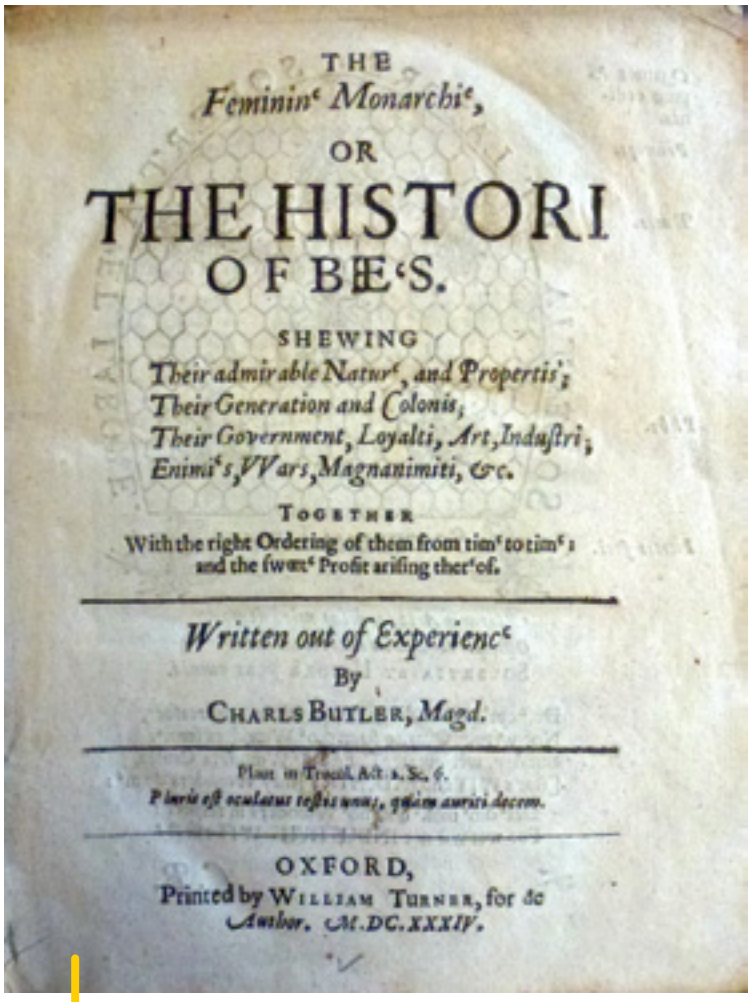
The most extraordinary thing is though people have been studying bees for ages, nobody really knows how the hive is governed. The one thing we know for certain is that the so-called queen has no authority at all. She is a fat, well mannered bee with much less intelligence than the rest of the workers. To be blunt, she is no more than a highly specialized cash cow to be kept as long as she is of use, and to be booted out if she isn't. I should mention that in their passion for a perfect Socialist system, the workers won't tolerate two queens; they have to fight a death match.

***An illustration from the magazine* Amazing Stories**

One queen is enough for the hive and since they want the most vigorous one they can have, they provoke the queens to fight, and if one tries to flee, they hem her in. As beekeepers know, the queen must kill her rival by plunging her sting, which she never uses for anything else, into the other queen's belly. Sometimes in the struggle between two queens each is in position to kill the other, and when that happens they leap apart as if completely terrified. If both should die, the hive might be left queenless, and this is about the only time in which honey bee socialism works to save the life of a single individual.

Whatever is governing the hive, can it really be simply inherited instinct? No doubt that would account for much of the bees' work, but it's hard to believe it's all instinctive. The gathering of honey, swarming and so on, may be pure instinct but there are plenty of other facts of bee life that seem to require some authority or supervision. Can the remarkable division of labor and apportionment of tasks be pure instinct? Some bees are dispatched to gather pollen, some are employed making wax, some set about varnishing the walls and some take turns ventilating the hive by fanning their wings. This last job is the most exhausting work a bee has to do. Could it be that some bees just *volunteer to do it*, and are not compelled to do so when others are enjoying flying to and fro in the Summer sun?

Most beekeepers lose a colony now and then, and there may be more than one idle hive about the yard. In the Spring, it is not uncommon to see an occasional bee visit the vacant hives for an inspection. It's a pretty good bet that these are advance scouts, looking for a place for the rest of the bees to take up residence. Is this purely instinctive? Or is the bee community ruled by some sort of committee? Who examines the candidates' qualifications and who decides which ones get the governing positions? We know there are always guards and fanners at that doors of the hive, but what about those other bees which seem to lurk about? Are they self-appointed bosses of the labor force? Perhaps these are members of the committee on duty: maybe



THE
Feminin[e] Monarchi[e],
OR
THE HISTORI
OF BE[E]S.
SHEWING
Their admirable Natur[e], and Propertis;
Their Generation and Colonis,
Their Government, Loyalti, Art, Industri,
Enimi[e]s, Wars, Magnanimiti, &c.
TOGETHER
With the right Ordering of them from tim[e] to tim[e]:
and the fwet[e] Profit arifing ther[e]of.
Written out of Experienc[e]
By
CHARLS BUTLER, *Magd.*
Plaut. in Trucul. Act. 2. Sc. 6.
Plurio eſt oculatus teſtis unus, quàm auriti decem.
OXFORD,
Printed by WILLIAM TURNER, for the
Author. M.DC.XXXIV.

***From* The Feminine Monarchie**

they are the special agents of the *secret authority.*

Most people know that there are serious problems connected with being a queen bee. For instance, in her first weeks she mates for life. An unmated queen can lay eggs but these only grow into drones. Perhaps eons ago, a drone was your typical male, able to feed himself and do a good day's work. The Socialistic *female rights movement* was the ruin of him and he has hopelessly degenerated under a system that transferred all serious work and responsibility to the females. He is entirely dependent on them, and for a while they seem content to ignore the big lugs.

After all, he's a happy go lucky, stumbling drunk whose spells of debauchery and sleeping it off are interrupted only when he's out and about idling in the sunshine. But what a price to pay! When the queen goes out to get impregnated, some kind of madness seizes all the neighborhood drones and they chase her like a mob of paparazzi chasing a superstar. Apparently they don't realize the winner in this lunatic competition gets a particularly nasty form of death as the grand prize. Well, there's no accounting for tastes and if the drone feels like losing the world for love, it ain't nobody's business but his and why should we care? It's not his fate but that of his mates which is the worst.

This is the *ideal Socialist state*, one which takes every policy to the extreme. When Summer's over and the sources of income are about dried up, the bosses decide to boot the bums out. Not everyone has had the patience nor the courage to watch: the workers throw themselves on the drones with savage fury but they don't sting them. That would be the waste of a good stinger. Better to drag them to the gangplank, bite off a wing or two and push him over. From the worker's point of view, it's the cheapest way to get rid of them. He's not coming back, and if a big fat toad doesn't get him, he'll starve or freeze soon enough. To the bosses, the drones are nothing but the idle rich, the leisure class and being more logical and more intelligent than human Socialists, they take advantage of the playboys before returning the hive to rigor and order.

There's still a lot to love about the bee. She's almost maniacal in her industriousness, and quite smart in her own way. To her love of color, and her most fortunate but entirely inexplicable habit of never mixing the pollen of different flowers except when stored in the hive, we owe most of the beauty of our gardens. Although some of the flowers are a bit too gaudy for everyone's taste.

But in the end, you have to admit that honey bees as a species are *an epic fail.* They turned the government over to sexless females with the result that they are now trapped in a web of Socialism with such remorseless efficiency that it has even been taken up by wasps and ants. They have sacrificed the happiness of the individual, and shortened their lives. A worker bee can live as long as six months, but they usually burn themselves out in a few weeks. They have a disgraceful callousness; they are prone to stealing when

the opportunity arises; they can be violently aggressive towards their neighbors; and they have become so brainwashed by the Socialist State that they go on working themselves to death to pile up wealth for the community, even to the point having more than they or their descendants could ever use.

This all makes sense in somebody's idea of how the world should work.

Charles Butler and the Feminine Monarchy

The idea that there must be a government of some sort in the hive is hardly new. The Greeks and Romans speculated on this topic, but their interpretations were also skewed by the conception of how a government *should work*. The whole topic was thrown upon its head by Charles Butler in his ground breaking volume entitled:

> The Feminine Monarchie, Or The Histori Of Bees. Shewing Their admirable Nature and Properties; Their Generation and Colonies; Their Government, Loyalti, Art, Industri; Enimies, Wars, Magnanimiti, &c. Together With the right Ordering of them from time to time: and the sweete Profit arising thereof.

To the modern reader, Butler's English is pretty difficult, being spelled differently from today's English, as well as using many obsolete words. In what follows, I rendered his words into contemporary language. He recounts the past authors and says:

> The Philosopher, in discussing the breeding of bees, admits being uncertain of their sex: and so, willing in this uncertainty to grace so worthy a creature with the worthier title, he always calls their governor *Rex* (that is to say, King). Those who followed him, looking no more closely than he did, were content to repeat what he said. So that I am obliged to stretch the ordinary meaning of the word *Rex*, and in such places to use the word *Queen*, as the males here have no role at all, this being an Amazonian or feminine kingdom.

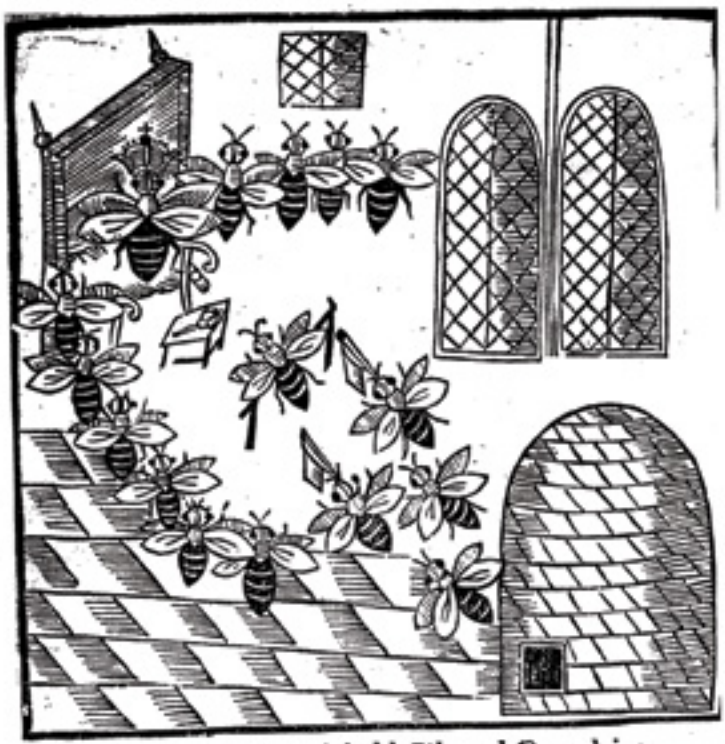
Butler describes her:

> The queen is a fair and stately bee, differing from the common bees both in shape and color: her back is of a brighter brown; her belly is even from the top of her mandibles to the tip of her tail, is of a sad yellow, somewhat deeper than the richest gold. She is longer than a honey bee, by one third part; that is, almost an inch long: she is also bigger than a honey bee, but not so big as a drone, although somewhat longer, her head proportionate, but more round than the little bees.

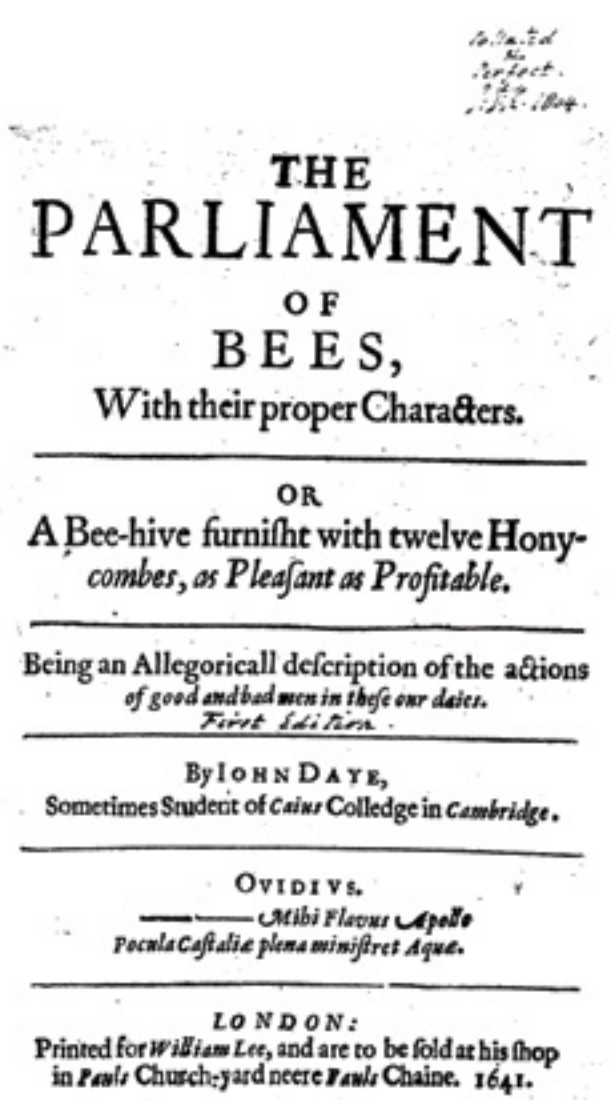
There follows this discussion of their governance:

> Besides their sovereign, the bees also have subordinate Governors and Leaders, resembling Captains and Colonels of soldiers: to distinguish from the rest they bear for their crest a tuft or tassel, some colored yellow, some maroon like a plume; some turn downward like an ostrich-feather, others stand upright like a heron-top. And of both types some are greater and some

From The Parliament of Bees



THe Parliament is held, Bils and Complaints
Heard and reform'd, with ſeverall reſtraints
Of uſurpt freedome; inſtituted Law
To keepe the Common-Wealth of Bees in awe.



THE
PARLIAMENT
OF
BEES,
With their proper Characters.

OR
A Bee-hive furniſht with twelve Hony-combes, as Pleaſant as Profitable.

Being an Allegoricall deſcription of the actions of good and bad men in theſe our daies.
First Edition.

By IOHN DAYE,
Sometimes Student of *Caius* Colledge in *Cambridge*.

OVIDIVS.
——— *Mihi Flavus Apollo*
Pocula Caſtalia plena miniſtret Aqua.

LONDON:
Printed for *William Lee*, and are to be ſold at his ſhop in *Pauls* Church-yard neere *Pauls* Chaine. 1641.

lesser, as if there were degrees of those dignities among them. In all other respects, they are like to the common bees. I think this is what the ancient writer Pliny meant when he said: "Around the king there were certain courtiers, and police officers, faithful guardians of authority."

In less than a quarter of an hour, you may see three or four of them come out of a good hive; but chiefly in June, before their constant labor has worn out these ornaments. One might well say, "they have a republic, policies and leaders." All of which, if one considers it seriously, one must acknowledge with admiration that singular wisdom, order and government in them, which in no other creature, excepting only humans (if even them) is to be found: and some have gone on to say: "I followed these signs and examples, and say that the bees are a part of the divine mind, brought forth from the Ether."

Honestly, I don't quite know what to make of all the talk about plumes and ornaments, but what is clear is that Butler echoed the ideas discussed in the first part of my article: that there is some sort of group of enforcers who, knowing the rules of governance, go about keeping order in the colony. Butler states: "The bees abhor as well Polyarchy as Anarchy, God having shewed in them unto men The Most Natural and Absolute Form of Government." In saying this, he repeats the tendency of people to see forms of governance in nature. According to them, these rules are a reflection of the Divine Order of God, as opposed to the systems invented by human beings, which all seem to center on the primary purpose of accumulating wealth and power by the few.

The apparent selfishness and greediness of the human race must be ameliorated by some sort of top down governance (according to the principles outlined thus far), either by an ideal socialist state or a monarchy overseen by a benevolent but essentially powerless queen. We are given examples of these two systems, and the implication they are created by the higher powers of nature or God.

Endnote

How else could a hive of bees be organized? On the surface they appear like so many teeming minions, and yet unlike a mob of people, they work cooperatively and civilly for the common good, having no selfish motivation whatsoever. Every generation looks into the honey bee hive and interprets what they see. The most recent example is *Honey Bee Democracy*. In it, Dr. Seeley describes how small groups of bees search for potential new homes (hollow trees for example), evaluate them as to their suitability, and then perform a sort of voting to bring about a consensus. They then lead the bulk of the colony, which apparently is willing to go wherever it's led, to the new home. I hardly think of this as democracy, since almost none of the bees have a vote or even knows where they are headed. And as all beekeepers know, honey bees often wind up in places that really aren't that well suited as home sites at all (like on the branch of a tree, unprotected from rain—let alone ice and snow). No, it seems more like a socialist system with a cadre of henchmen issuing orders and directing the laborers, none of whom will gain much benefit at all. In the end, I believe we must all admit: we haven't a clue as to what is going on there; neither how nor why. BC

Sources

Butler, C. (1623). *The feminine monarchie, or the historie of bees.* London : John Haviland.
Temple, M. H. (1919). "The Bolshevik Bee." *The Lotus Magazine.* Vol X. No. 2. February.

THE QUIET EVOLUTION OF APIARY MOWING

A Necessary Aspect of Apiary Management

Listen along here!

My First Real Job

When I was a young teenager, a friend and I would push our mowers around the community and offer to cut grass. We generally earned somewhere between $1.75-2.50 per yard total. We had to split the earnings. The mowers were not self-propelled. Consequently, as young entrepreneurs, we never had a body weight problem.

We developed a regular customer list and at our peak, we were cutting about twenty lawns per week. General expectations were that we cut in straight lines and tips were not offered. When we were thirsty, we drank water from faucets plumbed from the house. Dad provided the mower and the gas, but I was allowed to keep my earnings. Of course, he got his lawn cut for free.

To this day, I cut grass in bullet-straight lines, and I only mow when the lawn absolutely needs it. Now, throughout every Summer month, I marvel at the equipment that professional mowing services have and I compare all that modern equipment to the absolute minimal equipment that my friend and I used all those years ago. Times change, don't they?

Before Gasoline Mowers

Before gasoline mowers became widely available, lawns were cut using various manual methods and tools. The common methods used for lawn maintenance before gasoline mowers were scythes, sickles, weed slings, grazing animals, manual push mowers and scissors. None of these options were feasible without manual labor. Even grazing animals required fence installation. The invention of gasoline-powered mowers modernized lawn care and made it much more efficient and accessible for homeowners, landscapers and even beekeepers.

What Did this Mean for Apiaries?

It means that our apiaries, decades ago were weedier, and more unkempt by today's standards. I cannot find information indicating that grazing animals were common methods for foliage management in pre-mower days. No doubt, cows, horses and sheep would occasionally knock over hives or scratch against them.

Figure 1. A Kansas beeyard in 1920. Note beekeeper in the lower left of the photo who is wearing a vintage Alexander veil and gauntlet gloves.

In the past, all apiary grass and weeds were cut manually requiring hot labor commitments. I'm old enough to remember life before string trimmers and herbicides. Everything was weedier then.

To Add to the Laborious Task

In years past, just as the present, protective bee gear was commonly worn when cutting and pruning near bee hives. Wearing protective equipment was just as clumsy now as it was years ago. The requirement to wear protective clothing has always made apiary weed control a hot, tiring job. Thankfully, modern protective equipment is better ventilated and more comfortable, but it is still hot work.

No-Mow May

Due to my early years of incessantly cutting grass, as a senior citizen, I am now a reluctant lawn mower. To the chagrin of my neighbors whose lawns are always neatly manicured, I only mow when I must. In this way, I avoid needless mowing sessions and my bees have access to the clover and dandelions in my lawn.

When I first heard of the concept, I readily embraced the notion of a "*No-Mow May*" in which we just give our lawns a month off from trimming. I quickly found out that a mow-less May lead me directly into a hellish June, with tall grass that frequently required raking after cutting. I had to go back to the lawn maintenance drawing board.

String Trimmers in the Apiary

I don't remember the first time I used a string trimmer. With my mowing history that I touted before, that

Figure 2. In 1922, in this Iowa beeyard, all grass was cut using manual methods. Gasoline mowers, of the day, were heavy and uncommon.

memory void seems strange to me. But I do know that a string trimmer became a necessary component of the equipment that always went with me to an outyard. String trimmers are now a common, if unexciting, beeyard management tool. What's their story?

A Short History of String Trimmers

The history of string trimmers, also known as weed whackers, weed eaters or line trimmers, dates to the early 1970s. The concept of using a rotating nylon string to trim grass and *weeds* emerged as an alternative to traditional lawn mowers and manual cutting tools.

The concept of a rotating nylon line for cutting vegetation was developed in the late 1960s by George Ballas, a Houston-based entrepreneur. He got the idea while watching the revolving brushes at a car wash[1]. In 1971, he received a patent for his invention, which consisted of a fishing reel with fishing line attached to the spool. Ballas' invention was the foundation for the modern string trimmer.

In 1972, George Ballas partnered with Jim Goad, an engineer, to refine the design and create the first commercial string trimmer. They established the *Weed Eater* company and introduced the first gas-powered, handheld string trimmer to the market. This model quickly gained popularity due to its effectiveness in trimming grass and weeds in hard-to-reach areas.

In the late 1970s and early 1980s, electric string trimmers began to appear on the market. These models were lighter and quieter than their gas-powered counterparts, making them more appealing to homeowners with smaller yards.

Bees and Trimmers

No matter how useful power mowers and trimmers may be, on some mowing days, the bees seem to despise them. Most experienced beekeepers have seen this defensive behavior. In fact, common management recommendations warn the beekeeper to expect this attack. It is thought that the odors and vibrations from the mowers and trimmers agitate the bees.

In my own experience gained when trimming around hives, it seems that the bee response is greatest during Summer months when a nectar dearth has ended and the colonies are at full populations.

I have never used a battery-powered trimmer, but I am sure some of you have. I ask if you have noticed less of a response when using battery-powered mowers and trimmers? Does their quietness and lack of fumes have a more lenient effect on the colonies?

Beekeepers and Trimmers

At this moment, I have two, hand-held string trimmers. I have one modified with a cutting blade for heavy or tough growth. Brambles, such as multiflora rose, are a challenge for either type of cutting head.

Even though I frequently use them, I increasingly have issues with string trimmers. The evolving issue is that the older I become, my trimming sessions grow shorter and shorter. My shoulders ache. I get noise warnings from my Apple watch. I get hotter and hotter in the protective gear that I must wear. I simply can't do the job the way I once could.

Consequently, I have grown to dread the task more and more. All the while, the grass and weeds have continued to grow. Out of necessity, I developed a tolerant attitude of tall grasses and weeds in my apiary. I put my hives on firm hive stands that were twenty inches from the ground and I kept the entrance free of tall weeds. Even then, the grass and weeds in my beeyard continued to grow. My bees seemed unphased by the tall grass in the yards, but increasingly, it became apparent that this approach could not last. Why?

Two reasons that altered my laissez-faire system of yard maintenance evolved. The first reason was you, the reader of *Bee Culture* articles. Photos and videos that I captured in my apiary looked terrible. For instance, while I wanted to write about a new swarm that I just acquired, my photo of the new bee hive was marred by tall grass and the appearance of a generally unmanaged area. *(If you have back issues of Bee Culture, you can readily see these photos.)* I grew afraid that you, the reader, would not understand the bigger picture.

Figure 4. A manicured yard that uses herbicides, grazing animals and electric fencing to keeps foliage at bay. C. Parton Photo

Secondly, the tall weeds made it difficult for me walk while carrying a super of honey or other related bee equipment. Briars tugged at my suit. Tall grass made me stumble as I walked. Grass grew in and around my unused equipment. As with the *No-Mow May* scenario that I discussed earlier, I had to return to the drawing board. I was physically unable to trim my entire beeyard with a string trimmer and it was too much to ask of my 1972 Snapper push mower to systematically mow this tall grass.

Figure 3. An apiary with uncontrolled grass growth.

A Heavy Duty, Walk-Behind Trimmer

I would occasionally see advertisements for various models of walk-behind trimmers. I asked around my circle of beekeeping friends, but no one had experience with these machines. I checked online. Yes, wheel kits were available for my string trimmers. In theory, I could modify my handheld trimmers to be mobile. Again, I asked around my circle

[1]I find this interesting. The common safety razor was envisioned after a visionary watched a woodworker use a common hand plane. The flail honey comb uncapper was conceptualized as another visionary watched the conveyor belt perform at a grocery store checkout. Shouldn't we all be more observant?

of beekeeping friends, but no one had experience with these wheel kits either. All the while, the grass continued to grow. Would a trimmer on wheels allow me to work longer and more consistently?

In mid-July, with apiary grass higher than my knees, I broke. This situation in my apiary was unacceptable and was never going to get better. I went to an equipment dealer to buy a wheel kit. They did not have one, but they did have a single walk-behind trimmer on the showroom floor. It was $400. I bought it on the spot. It uses four .175" spiral cutting cords and cuts a twenty-two-inch swatch. It cuts at five heights – from 1.5" to 3.5". I set it to the highest setting. The machine fairly easily chewed through the tall weeds leaving me with a somewhat rough-looking finished job, but the weeds were readily cut down.

Figure 5. A walk-behind Cord Trimmer.

The nose on the machine does a reasonably good job of getting beneath my hive stands – not perfect – but reasonably good. The cords are not cost free and they do wear out, but the machine aggressively took out tall weeds. It worked.

The major drawback is that I must still push the machine through tall grass. That requires old fashioned perspiration, but it's still easier than using a handheld string unit. Please know that I am not selling these units. I'm only looking for a yard maintenance remedy.

For beekeepers younger than or more physically fit than I am, a typical string trimmer would get the job done. As I have written in previous articles, I'm at a stage of my beekeeping where I try to put wheels on everything. String trimmers were no exception. I should also say that while the bees didn't go crazy, I still needed to wear light protective gear when using the machine.

Figure 6. Weed whacking beneath hives.

Hot and Clumsy

This past July 2023 was the hottest July every recorded. Yet the grass kept growing. To keep the grass under control, grass-cutting beekeepers are hot, and clumsy, and are surrounded by irate bees. Can it get any worse? Yes, it can, at the same time, we are also using power mowing equipment. Occasionally, accidents happen. This is a beekeeper's recent story.

I got home from work and my wife wanted to cut the grass but she'd never used that particular riding mower. I changed out of my work boots into my Crocs and pulled the mower out of the garage for her. I decided to make a couple passes by my bee hives so my wife wouldn't get stung.

My bees have never bothered me before. On the first pass, I had hundreds of bees come after me. They were stinging me so much that I was fearful I might have an allergic reaction. I quickly decided to jump off the riding mower and make a run for the house. My foot got caught in the pulley and belt on the mower deck. My croc stayed lodged in the mower belt while I ran into the house. When I got inside and got all the bees off me, I realized how badly my foot was hurt.

I went to the Emergency Room where they said it had broken my toe and cut a tendon. It almost cut my toe off. I had 12 stitches and had to wear a Draco shoe that keeps the weight on my heel and off my toe until my broken toe can heal.

Figure 7. Accidents happen quickly. Attacking bees can be distracting. Many of us have a story.

Mowing is Not Beekeeping

Every apiary mowing situation is different but presently, we have an abundance of diversified mowing devices. That selection of devices does not mean that mowing is not hot, demanding work. Don't go crazy cutting grass and weeds, but when you do mow, I would suggest wearing heavy shoes and a ventilated bee suit with a veil that opens to allow for water sips. Have a lit smoker at the ready. Mowing is not beekeeping. Pace yourself.

Thank you.

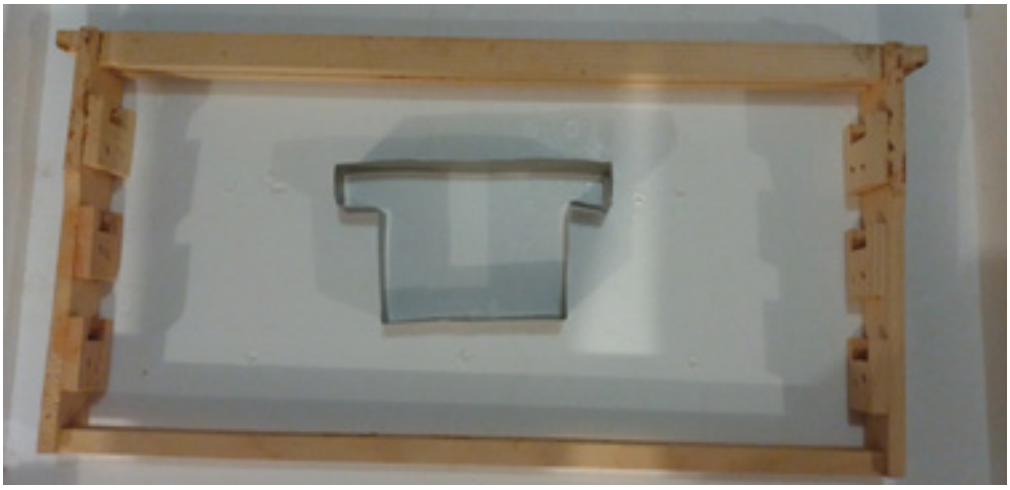
I appreciate you reading and sending any comments that you may have. Your time is valuable. I know that. BC

Dr. James E. Tew
Emeritus Faculty, Entomology
The Ohio State University
tewbee2@gmail.com

Co-Host, Honey Bee Obscura Podcast
www.honeybeeobscura.com

Honey Cutout Cookies

Laurie Lawrence



Icing Ingredients

- □ 3 to 3½ cups powdered sugar depending on whether or not you add food coloring
- □ 2 teaspoon vanilla
- □ 4 tablespoons melted butter
- □ 1 teaspoon honey
- □ 3 to 5 tablespoons milk
- □ Optional: for the color of honey use 9 drops yellow food coloring, 1 drop red food coloring and 1 drop blue food coloring

Icing Directions

Step 1
Combine powdered sugar, vanilla, butter, honey and milk until smooth.

Step 2
Then add food coloring. Gel food coloring works best.

Step 3
Ice cookies then immediately lay out on wax paper or parchment paper to let icing set.

Step 4
Layer cookies between parchment paper in air tight container for storage.

Step 5
Keep refrigerated and enjoy!

Cookie Ingredients

- □ 2½ cups + 4 tablespoons all-purpose flour
- □ ⅔ cup corn starch
- □ 1 teaspoon salt
- □ ½ cup + 2 tablespoons brown sugar
- □ 2 teaspoon cinnamon
- □ 1 cup cold butter (cut into small pieces)
- □ 2 large eggs
- □ 4 tablespoons honey
- □ 2 tablespoons milk

Cookie Directions

Step 1
In a large bowl combine flour, corn starch, baking powder, salt, brown sugar and cinnamon. Mix well.

Step 2
Add the pieces of butter and combine until mixed into course combs.

Step 3
Add honey, eggs and milk. Mix with spoon until you can knead with your hands.

Step 4
Once you can form a smooth ball of dough, wrap in plastic wrap. Refrigerate 3 hours.

Step 5
Pre-heat over to 350°F. Line cookie sheets with parchment paper.

Step 6
On a floured, flat surface, roll dough into ¼-inch thickness and but cookies out with cookie cutter(s). I made on in the shape of a bee frame!

Step 7
Place on cookie sheets and back for 10 minutes.

Step 8
Let cool completely then frost.

CALENDAR

♦FLORIDA♦

The Palm Beach County Beekeepers Association presents the **South Florida Honey Bee Expo 2024** from Friday, February 16 through Saturday, February 17, 2024. The expo will be held at the Loxahatchee Groves campus of Palm Beach State College at 15845 Southern Blvd, Loxahatchee Groves, FL 33470.

Presenters include Ellen Topitzhofer (Cornell University), Petra Ahnert (author of *Beehive Alchemy*), Nathan Reid (Dalan Animal Health) and Chris Werner (Indian Summer Honey Farm).

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

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

♦ILLINOIS♦

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

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

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

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

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

♦INDIANA♦

The Beekeepers of Indiana will be holding their Fall Conference and Workshop on October 27-28, 2023. The event will begin on Friday evening with speaker talks and a snack.

The keynote speaker this year is Bob Bennie. Bob began commercial beekeeping in 1981 in Oregon and has been involved in commercial beekeeping in 10 states.

Other speakers include Mike Champlin who will present on "Bee Gadgets and Hacks, Stephanie Slate who will give tips and tricks for "Entering Honey Shows" and Jerry Zimmerman who will cover "Bee Biology".

There will be a Smoker Contest, Honey Show, Raffle and Auction. There will also be an area for vendors.

The cost is $50 for members, $60 for non-members and $25 for children 15 and under. The cost includes both the Friday and Saturday programs and a lunch on Saturday.

Registration is open at: **https://indianabeekeeper.com/events/fall_conferrence__workshops**

♦LOUISIANA♦

The Louisiana State Beekeepers Association and the USDA Honey Bee Breeding, Genetics and Physiology Laboratory will hold the 27th Annual Field Day on Saturday, October 8th, 2023. The event will be held at the USDA laboratory, located at 1157 Ben Hur Rd, Baton Rouge, LA 70820. This is near the intersection of Nicholson Drive (Hwy 30) and Brightside Dr., which is about two miles south of the LSU football stadium.

Gates will open at 8am, with presentations and activities scheduled from 9am-3:30pm. The Field Day will include a series of talks in the morning for members of the Louisiana Beekeepers Association and the USDA staff about Louisiana beekeeping and research conducted at USDA lab. The afternoon features break-out sessions for beekeepers of all ranges of experience.

The beginning beekeeper course topics will include basic bee biology as well as necessary beekeeping equipment and management techniques. The intermediate beekeeping course topics will include detecting signs of parasites and pathogens, performing swarm captures and cut-outs, followed by a final field session examining open colonies. There will be a workshop for advanced beekeepers that focuses on principles of selective breeding followed by a final session on queen rearing techniques.

LBA member registration fee of $35 and non-member fee of $40 for attendees 12 years of age and above. Children 11 and under must stay with their parents at all times. Registration includes a catered lunch.

Register at **www.labeekeepers.org** and pay by credit card or mail a check and a copy of the registration form to Louisiana Beekeepers Association to Beth Derr, 210 Meadowlark Dr, Jefferson, TX 75657. If mailing, it must be postmarked by October 1, 2023. Walk-up registration will be collected at the door for $40 per person.

For additional information, please visit **www.labeekeepers.org**. Alternatively, contact Kevin Langley (504-669-6830) at **la4honeybees@gmail.com** or Kate E. Ehle, PhD (225-692-1967) at **kate.ihle@usda.gov**.

♦NEBRASKA♦

The Omaha Bee Club 2023 Convention will be held at Journey Church in Gretna, NE on Saturday, October 14, 2023.

Speakers and demonstrations include Dr. Jim Tew (zoom), Jeff Horchoff "Mr. Ed" (zoom), Landi Simone (zoom), Rob Snyder (zoom) and many others.

The event will include vendors, professional honey judging by Ginny Mitchell, a silent auction, classroom interaction and a catered lunch.

Go to **www.OmahaBeeClub.com** or the Omaha Bee Club Facebook page for more information and to sign up.

♦OHIO♦

OSBA Fall Conference will be held on October 27-28, 2023 in Wooster, OH.

Speakers will include Rod Zickefoose, Jeff Gabric, Barbara Bloetscher, Dwight Wilson, Dave Noble, Joe Kovaleski, Dr. Tracy Farone and Reed Johnson.

There will be something for everyone from beginner to experienced beekeepers. The conference will include speakers, how-tos, latest research, honey judging, drawings and vendors.

Online registration starts on September 1, 2023. Prices are as follows: Members $55, Non-members $65 and Students $30. The price includes both days attendance and lunch on Saturday.

See more information of Facebook or on the website: **https://ohiostatebeekeepers.org/**

♦OKLAHOMA♦

The Oklahoma State Beekeepers Association will be having their Fall conference on October 27 and 28, 2023 in Oklahoma City. The meeting will be at the Will Rogers Garden Center at 3400 NW 36th St, OKC.

More information is available at **https://soonerbees.org/**.

♦PENNSYLVANIA♦

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

Early bird tickets go on sale in September 2023.

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

♦SOUTH DAKOTA♦

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

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

♦TEXAS♦

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

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

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

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

♦WASHINGTON♦

The **Washington State Beekeepers Association (WASBA)'s** upcoming beekeeping conference is October 7-8, 2023 in Olympia, WA!

The event will include a Saturday evening banquet with the famous "Dessert Auction", a live auction, raffles and much more!

The conference will conclude with the WASBA Annual Board Meeting on Sunday, October 8.

Profits from the conference benefits Washington Honey Bee Research.

You can learn more at **https://wasba.org/**.

♦ABF♦

The 2024 ABF Conference and Tradeshow will begins with a dinner on Tuesday, January 9th, 2024 and ends on Saturday, January 13th, 2024. The conference will be focused on three areas: education, fun and something new.

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

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

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

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

Registration is now open with early bird registration rates through October 31, 2023. Pre-registration will close on December 26, 2023.

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

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

* 10% discount for active military and first responders.

CLASSIFIEDS

Display Advertisers

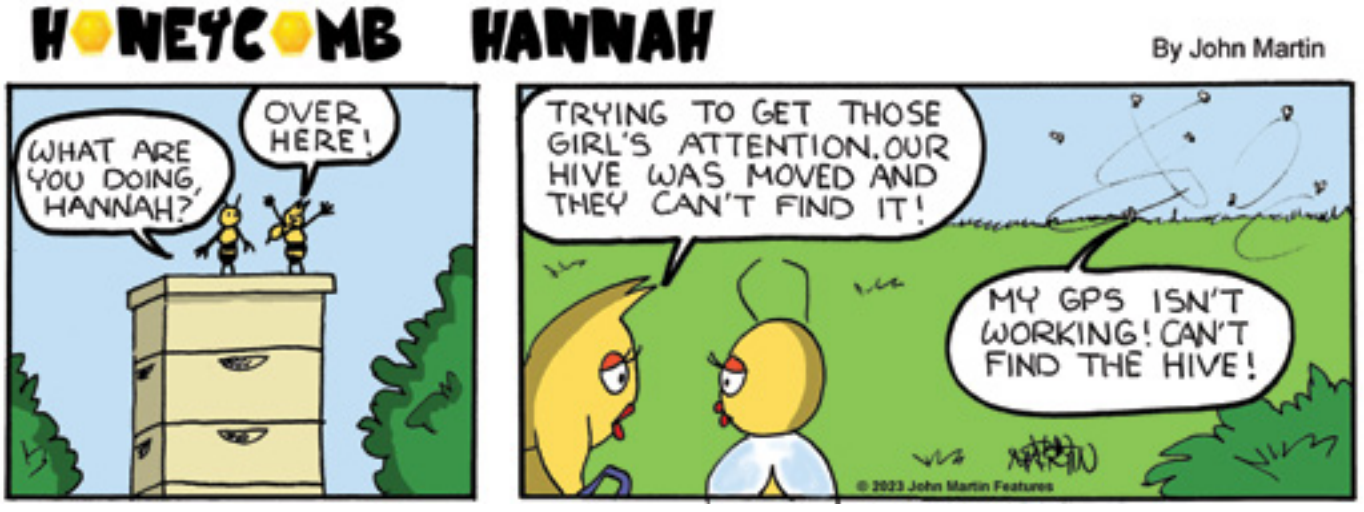


Image Contest – Honey Haul

How To Submit:
Email your images to **Jen@BeeCulture.com**
Use the subject "**Image Gallery**"
Please include in your email:
- The image as an attachment (we will not consider it if it is embedded)
- Your First and Last name
- Your mailing address
- Your renewal code (if you know it)

Prince's Plume and Scorpion Weed

Ed Colby

Last night I tossed and turned, worrying about whatever popped into my head, which was everything: *Varroa* mites, global heating, my back taxes, our wreck of a farm, the nanny goat going blind with incurable pink eye, my sidekick Marilyn's never ending house remodel, and of course my own mortality. Ah yes, mortality. God blinks. Time's up.

By morning, my affairs seemed more manageable. I said to Marilyn, "In the wee hours things can look pretty bleak, but in the light of day I'm all cheerful again. Nothing really changes of course. It's all in how we look at it. It's like we've got the whole world inside our head."

"Funny," she said, "but it's the opposite with me. The nights are good. The days, sometimes not so much."

Paul occasionally has to listen to me whine about my bee locations. Owing to suburbanization, modern farm machinery that cuts the alfalfa quicker than ever, and the get-rich-quick hemp debacle that took so much alfalfa out of production, some of my yards don't produce honey like they used to.

Back in late May, on our way fishing, Paul said, "There's a place out in the desert where there's a big bloom of prince's plume and scorpion weed. If somebody set down some bees out there, they'd probably make a lot of honey."

I pondered this. Prince's plume? Scorpion weed? Never heard of 'em. This was too far away. It would be a gas-guzzling, time-consuming gamble, right when I was already over my head trying to keep up with my bees.

But I don't sleep, remember? I dreamed of prince's plume and a bumper honey crop. So I hit the road to check out Paul's spot. It sat at the margin of the still snowcapped Colorado Rockies and the desert lands that stretch westward into Utah. This was canyon country, stunning in that Zane Grey western way.

I found Paul's two-mile-long stand of yellow prince's plume waving in the breeze. Scattered scorpion weed with its curled purple flowers had mostly gone to seed. I wondered if I was a day late and a dollar short.

Now, where to put some bees? There was apparently no private property. Everywhere I went signs warned me to stay on the main Bureau of Land Management (BLM) road. Plus I had no permission to set down a load of bees. On government land, applying for and then actually receiving a beekeeping permit might take until Christmas, if then.

Finally, I wandered onto an abandoned army bombing range a mile from the prince's plume. A bombing range! I am not making this up. It had a dirt road with no tire tracks on it. A sign warned that if I encountered unexploded ordnance, not to touch it or take it home but to contact the BLM. There were bomb craters everywhere. I felt like Brigham Young. This was the place.

I figured I'd just wing it. You can camp about anywhere you want on BLM land. And if I never unloaded my bees, just left them on the truck, you could call it camping with bees, right? Think about it. A BLM ranger stumbles onto an ancient flatbed truck with bees on it, out in the middle of nowhere. What's she going to do? Call the FBI?

I found a location I thought might work. It was on a spur off the main bombing range road. If you parked a truck there, you could see it from the paved highway a quarter-mile away but it would be far enough away that you couldn't tell it had bees on it. And it wasn't so hidden that a thief might pilfer my bees with impunity. I don't know if that makes sense, but that's how I saw it.

All right then. I drove home and immediately got cold feet. I called Marilyn's sister Nancy who is retired U.S. Forest Service, hoping she'd talk me out of this. But the audacity of my plan only seemed to intrigue her. She gave me a wink and a nod. As for Marilyn, she never met an adventure she didn't like. "Go for it! Whatever happens, you can write about it in *Bee Culture*!"

So I loaded 13 colonies onto my one-ton '83 Ford Econoline van that Paul long ago converted to a flatbed bee hauler. When I turned the key, the rebuilt 460 engine sputtered and then purred. Not much to look at, this is one bee-haulin' machine. I departed at first light. Marilyn followed in her Subaru.

At the bombing range, as soon as I spread out the hives on the flatbed, my little darlings got on a honey flow. Katie bar the door! This could be good!

Then I jumped into the Subaru with Marilyn and took her out to breakfast.

Two weeks later, when I came back to haul those bees to their Summer range in the high country, they'd made scarcely any honey. I suspect the prince's plume and scorpion weed yielded nectar at some point. I reckon I dropped off my bees too late, that's all.

But Marilyn was right: At least I got a story out of this. BC

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

BOTTOM BOARD

Blue Sky bee supply®

With so much to do this year, visit www.blueskybeesupply.com to shop for the tools you need to get it done!

FULL-SIZE CUT COMB BOXES
50ct for $109.95
100ct for $189.95

HALF-SIZE CUT COMB BOXES
80ct for $99.95
160ct for $174.95

HINGED CLEAR COMB TRAYS
40ct for $24.95
200ct for $79.95

Full-Size 4" x 4"

HEATED COMB CUTTER
Available in half-size or full-size!

The heated cutting blade cuts pieces precisely to fit perfectly in standard-cut comb plastic containers. Made in the USA.

Made in the USA

Half-Size 2" x 4"

ALL COLORS BACK IN STOCK

Don't forget about our **Rainbow Caps**

to match your honey labels or market your honey varietals!

ALL PRICES IN THIS AD ARE SUBJECT TO CHANGE

Honey Bottling

Caps

PRINTED METAL CAPS
Available in 2 designs & 2 sizes! 58mm to fit our 12 oz. skep jar or 12 oz. hex embossed cylinder. 43mm to fit our 3 oz. skep jar.

Plastic

a

PLASTIC PANEL BEARS
2 oz Panel Bears
$70.21 / 160 Ct. Case
WITH Caps
6 oz Panel Bears
$211.20 / 660 Ct. Case
No Caps
12 oz Panel Bears
$127.95 / 365 Ct. Case
No Caps
16 oz Panel Bears
$91.95 / 200 Ct. Case
No Caps

b

DECO EMBOSSED JUGS
5 LB - $103.95 / 72 Ct. Case
3 LB - $127.95 / 126 Ct. Case *No Caps*
1 LB - $140.44 / 300 Ct. Case *No Caps*

CLASSIC PLASTIC JARS

c
32 oz - $79.95 / 110 Ct. Case
No Caps
16 oz - $96.95 / 225 Ct. Case
No Caps

d

SQUARE PLASTIC
16 oz - $225.95 / 343 Ct. Case
With Lids

Glass

e

GLASS 3 OZ. MINI MASON
$22.95 / 36 Ct. Case
Lids now available in Gold, Black or White

f

GLASS 12 OZ. HEX EMBOSSED CYLINDER
$11.95 / 12 Ct. Case
Gold Metal Lids Included

g

12 OZ & 3 OZ GLASS SKEP JARS
12 oz Skep Jars $16.95 / 12 Ct.
3 oz Skep Jars $14.95 / 24 Ct.
Gold Metal Lids Included

h

MUTH JARS
4 oz - $31.95 / 36 Ct. Case
8 oz - $14.95 / 12 Ct. Case
16 oz - $22.95 / 12ct. Case
Includes Corks

i

CLASSIC GLASS JARS
8oz - $19.10 / 24 Ct. Case
16 oz - $10.60 / 12 Ct. Case
32 oz - $15.75 / 12 Ct. Case

ALL PRICES IN THIS AD ARE SUBJECT TO CHANGE

FOR BEES. FOR HONEY. FOR EVERYONE. | (877) 529-9BEE | WWW.BLUESKYBEESUPPLY.COM

Quality Nutrition | Higher Honey Yields | Ready to Use | Protein Rich

A PRODUCT BY MANNLAKE

5% NATURAL POLLEN

15% CRUDE PROTEIN

High protein content to promote brood rearing

NEW! ULTRA BEE plus

HIGH PROTEIN NATURAL POLLEN SUBSTITUTE

MADE IN USA

Contains 5% natural, USA pollen, irradiated to prevent the spread of honeybee diseases

HONEYBEE FEED IN CONVENIENT PATTY FORM

Same great formula as Ultra Bee with the addition of natural USA pollen!

CONTAINS NATURAL POLLEN FOR HEALTHIER, STRONGER BEES!

FD316	Ultra Bee Plus Patties With Natural Pollen, 2100 lb
FD313	Ultra Bee Plus Patties With Natural Pollen, Single
FD315	Ultra Bee Plus Patties With Natural Pollen, 40 lb

Scan To Shop

THOUSANDS of products

EXCLUSIVE online sales

MANNLAKE
MANNLAKELTD.COM

800-880-7694

SIX RETAIL locations

CUSTOMER SERVICE for all your needs