

Bee Culture's

BEE Keeping

Autumn 2020®

Your First Three Years



What's Next
Bottle It Yourself

Bee Vet
What's Coming

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BEEKeeping

Autumn '20[®]

Your First Three Years

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Let's Eat!



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BEEKeeping

Summer '20[®]

Your First Three Years



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HONEY BEE HEALTH COALITION™

Honey Bee Health Coalition

For over 40 years I have worked in and around the honey bee and beekeeping industry. After a stint as a High School teacher, I went back to college at Ohio State University to learn about Honey Bees from Dr. Jim Tew. Then on to the USDA Bee Breeding

and Stock Lab, (as it was titled back in the 80's), for a short time, then to Dadant and Sons and the *American Bee Journal* for a long time. I then joined the Florida Dept. of Agriculture and Consumer Services as the Chief of the Apiary Inspection Section for almost a decade. I then went on to work on RNAi with Monsanto to control *Varroa*, and now as editor of *Bee Culture* magazine.

I've been a beekeeper before *Varroa* and now on this journey after *Varroa* and all the collateral health effects that we are struggling with. I've seen bees mysteriously disappear with CCD. I've seen people and animals killed by Africanized Bees. I've seen prairie lands converted to ag lands, which meant less flowers for bees and more impacts from pesticides. All of these things changed how a beekeeper operates and put a strain on the longstanding relationships between farmers and beekeepers and the environment – both in the informal sense, where a case of honey was exchanged for putting hives on a neighbor's lands, to more formal contract pollination services and a business relationship.

Our vocation and/or avocation of Beekeeping, our relationship to our vital environment and partnership with this little insect along with our connection with agriculture was tittering on the edge and something had to be done to save it.

On a cold day in December 2013, myself and 37 other bee health professionals stepped off a bus into eight inches of freshly fallen snow in Keystone, Colorado. We holed up at 9,000 feet to discuss what pivot was needed to change the course of bee health decline, specifically on and around agriculture lands as this was where many were convinced honey bee health decline began. We began by discussing all the other great work being done on this issue and whether, and if so how, we could complement other efforts and not compete with them. We all agreed that everyone was busy and that if something

were to stick, we'd have to be an action- and results-oriented group first and foremost.

We set to work and identified our mission and vision. We formed smaller working groups to address what's called the four P's – pests and pathogens, pesticides, and poor forage and nutrition – and determine what each of the groups' first order of business would be. We developed a governance system that gave everyone an equal voice. After two days, we formed the genesis of the Honey Bee Health Coalition.

Hopefully, many of you reading this have heard of the Coalition or perhaps seen our seminal work, the *Tools for Varroa Management Guide*. Since that first meeting, we've developed an extensive library of resources for beekeepers and farmers and provided guidance and tools for how we can all play a part in reversing bee health decline. Beyond what we've produced, there's an intangible benefit that still permeates our meetings. This was born out of hard conversations, raised voices, and staunch disagreements. After six years of sitting in the same room, donning bee suits, visiting farms, and enduring hundreds of hours of conference calls, relationships and trust have formed. These relationships enable the group to talk about difficult topics deliberately and respectfully. We don't discuss the relative weights of the four P's. All are equally important, and all require the same level of attention.

All these things have enabled the Coalition to keep churning out and marketing a slew of high quality, free, and dependable resources for farmers and beekeepers.

Over the next several months, I would like to use this column to tell you about what the Honey Bee Health Coalition has done. And what it needs to do but can't as quickly as needed without your help. My not-so-hidden agenda is to get you to know about these tools and resources and then actively use these tools and resources. I want you to share these with your fellow beekeepers and use them to have conversations with your farmer brethren. Farmers and beekeepers rely on each other to bring sustenance to our fellow Americans. We are all part of the environment and agriculture, and I look forward to showcasing an extensive body of work that I think you'll find both helpful and intriguing.

We are all in this together.

Jerry Hayes

Learn more at www.honeybeehealthcoalition.com



HONEY BEE HEALTH COALITION

Check out our FREE Beekeeping Resources:

VARROA MANAGEMENT GUIDE

A practical guide and step-by-step demonstration videos featuring safe, effective methods to detect, monitor, and control *Varroa* mite infestations.

HONEYBEEHEALTHCOALITION.ORG/VARROA

BMPs FOR BEE HEALTH

A guide for beekeepers featuring Best Management Practices on safety, pesticide exposure, bee nutrition, hive maintenance, treatment of pests and disease, and more.

HONEYBEEHEALTHCOALITION.ORG/HIVEHEALTHBMPs

VARROA MANAGEMENT TOOL

An interactive decision tree that provides beekeepers with *Varroa* management and treatment options based on their specific circumstances and hive conditions.

HONEYBEEHEALTHCOALITION.ORG/VARROATOOL



Excerpt from an old A.I Root Publication, 'The Honey Bee – A Grower's Guide'. We're not sure of the actual date – but there was a video offered with the guide for \$49.95.

The Inspection Process

The only fair way to judge a colony is by a visual inspection of the next. While some growers judge the value of a colony the level of foraging activity at the colony entrance or by the number of bees in the field, neither of these methods is likely to give you a true picture of the colony's worth. Temperature, level of sunlight, wind speed, and the time of day all play important roles in determining foraging activity. Also, a low number of bees foraging in your field may be the result of your crop's failure to produce a large enough amount of nectar to attract the bees, or of competing crops in nearby fields. All of these circumstances are out of the beekeeper's control. So, to be fair to both beekeeper and grower, a visual inspection of the nest is best. The inspection should be conducted when the temperature is above 60°F. if the temperature is lower than this, the bees may be clustered tightly on the comb, and it will be more difficult to obtain an accurate.

Bees In The Field

Remember, when inspections are conducted, most of the foraging force will be in the field. This field force can represent a substantial portion of the colony's population, and it is essential that these be counted and added to the total estimate for the number of combs of bees. To make this adjustment, you must make an assumption about the average length of a foraging flight. While the actual length of individual foraging flights can vary widely, an

estimate of 30 minutes is reasonable in light of available information.

To estimate the number of bees in the field, the consultant should count the number of bees returning to the nest during a one-minute period. For example, if the average round-trip flight time, t , for a forager is 30 minutes, and the number of bees, n , returning during a one minute period, is 150, then the total number of bees in the field, TB , can be estimated as:


$$\begin{aligned} TB &= t \times n \\ &= 30 \text{ minutes} \times 150 \text{ bees/min} \\ &= 4,500 \text{ bees} \end{aligned}$$

After you obtain this number, you must convert it to the equivalent number of full-depth combs of bees. Assuming that there are 2,000 bees per full-depth comb (both sides), the adjustment (ADJ) to the number of bees, expressed as equivalent full-depth combs of bees, is:

$$\begin{aligned} ADJ &= 4,500 \text{ Bees} \times 1 \text{ Comb}/2,000 \text{ Bees} \\ &= 4,500 \text{ Bees} \times 0.0005 \text{ Comb}/\text{Bee} \\ &= 2.25 \text{ Full-Depth Combs} \end{aligned}$$

This number is added to the estimate of the number of full-depth combs of bees in the colony. On the data collection form, the calculation of the adjustment factor is set up as:

$$ADJ = \frac{B}{M} \times 30M \times (0.0004) = _ \text{ (in Full-Depth combs of Bees)}$$

Where B/M = number of bees per minute counted at the entrance, 30 = the average length of a foraging trip in minutes, (0.0005) converts the number of bees to the equivalent number of full-depth combs of bees. 

Cooking With Honey

Shana Archibald 

Pecan Crumble

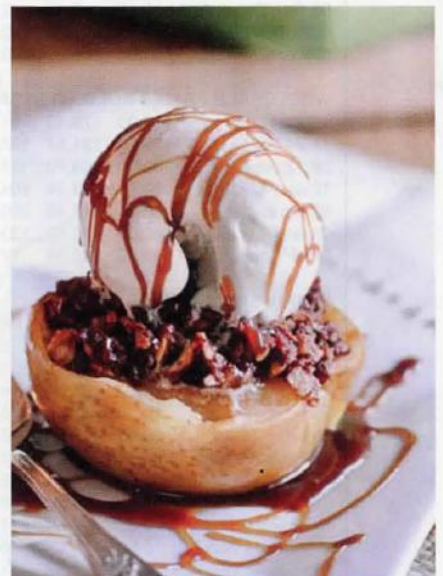
- 4 granny smith (or honeycrisp) apples
- 1/4 cup honey
- 1/4 cup cold butter
- 1/2 cup shredded coconut
- 3 teaspoons cinnamon
- 1/4 teaspoon sea salt
- 1 cup chopped pecans

Preheat oven to 375°F. Grease a 6" X 9" casserole dish with butter and set aside.

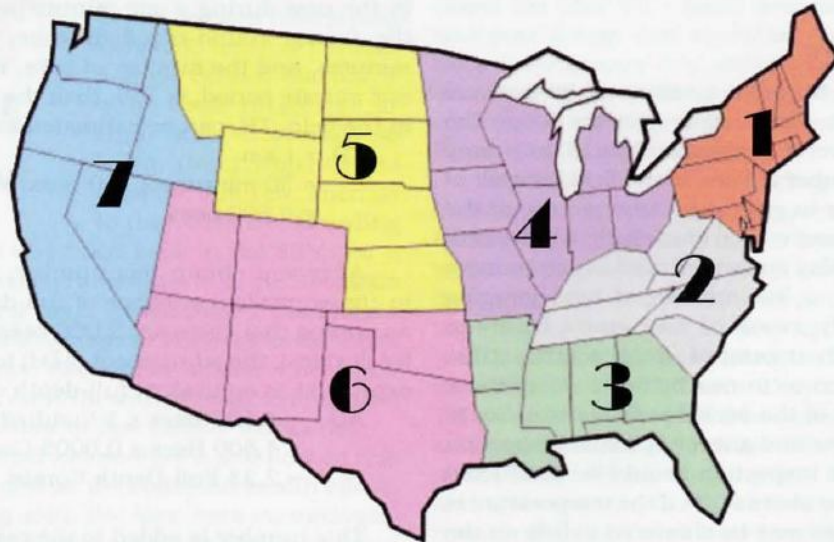
Cut the apples in half, remove the core with a melon baller or similar tool. I like to use my metal measuring spoons. Combine all topping ingredients except the pecans in a food processor and pulse until combined well.

Add coarsely chopped pecans towards the end and pulse a few times until evenly combined. Spoon two to three tablespoons of pecan crumble onto the apple halves. Bake for 40 minutes or until apples are tender but not mushy.

Remove apples, top with scoop of vanilla ice cream (or any ice cream of your choosing) and drizzle with salted caramel sauce. (Optional)



AUTUMN REGIONAL HONEY REPORT



Selling Honey

Honey prices during the COVID-19 shutdown and now in this 2nd wave have been relatively stable even with social distancing and restricted access to retail stores. 80% of the U.S. population lives in urban areas and they have been buying honey in bulk in many cases anticipating a 'food apocalypse'. Manuka Honey from NZ has seen a surge because of its enhanced health properties. With the 2nd wave of Covid-19 and its continued social distancing restrictions many people are buying honey especially if they can get it locally from real beekeepers or newly organized regional on-line markets. Honey is considered a natural food that can fill health and wellness gaps. If you haven't done it already be sure to share by text or email with your friends, neighbors and community that you are a local beekeepers and have X amount of local, natural honey for sale. And don't be bashful on price. You fill a gap with a trusted food that you want to build local support with. Time to be an entrepreneur! If you don't want to be an entrepreneur that is fine too. Put your surplus honey in ½ or 1 lb. jars with your label on them and take them to the local food bank. Those out of work and in real need will appreciate the honey and get tremendous food value from your local honey and you the local beekeeper.

REPORTING REGIONS								SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	\$/lb	May 2020	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.21	2.26	2.18	2.11	2.20	1.93	2.50	1.53-3.00	2.15	2.15	2.16	2.17
55 Gal. Drum, Ambr	2.12	2.19	2.02	2.01	2.12	1.78	2.43	1.35-3.00	2.07	2.07	2.05	2.07
60# Light (retail)	210.00	199.80	193.33	172.57	163.33	183.95	205.00	131.84-325.00	203.50	3.39	205.01	204.69
60# Amber (retail)	200.00	200.20	203.33	167.43	213.26	182.46	206.25	119.84-325.00	204.11	3.40	204.24	207.03
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	74.00	79.73	97.20	79.50	61.20	107.88	107.88	60.00-194.40	88.56	7.38	88.80	89.49
1# 24/case	120.00	131.57	138.94	113.82	152.50	94.60	144.00	45.00-300.00	135.46	5.64	138.65	132.49
2# 12/case	102.00	108.70	118.35	103.69	111.84	96.00	132.00	72.00-246.00	119.66	4.99	120.67	115.39
12.oz. Plas. 24/cs	89.00	103.74	104.67	92.22	94.00	101.40	120.00	66.00-180.00	99.77	5.54	99.56	102.41
5# 6/case	80.00	114.48	190.50	113.82	113.16	105.00	148.52	71.50-240.00	141.30	4.71	139.25	129.43
Quarts 12/case	140.00	156.63	133.65	139.42	168.20	155.70	204.00	109.20-300.00	158.42	4.40	151.80	153.66
Pints 12/case	90.00	98.74	77.67	86.47	149.42	94.00	103.24	60.00-159.84	96.56	5.36	95.91	94.81
RETAIL SHELF PRICES												
1/2#	4.50	5.38	4.88	4.72	3.80	5.65	5.65	3.00-9.50	5.05	10.09	5.18	4.92
12 oz. Plastic	7.50	7.21	5.38	5.65	5.10	6.33	6.00	3.50-12.00	6.05	8.06	6.16	6.17
1# Glass/Plastic	9.50	8.58	8.44	6.82	8.45	6.86	8.33	4.79-17.00	8.21	8.21	8.13	7.86
2# Glass/Plastic	14.50	13.57	14.66	11.73	13.90	13.50	15.00	8.39-25.00	13.86	6.93	14.29	13.11
Pint	12.50	11.13	8.21	11.31	10.80	10.75	12.57	4.00-25.00	10.64	7.09	11.20	10.65
Quart	19.50	18.98	15.57	15.36	17.25	17.60	20.33	8.00-32.00	17.73	5.91	18.14	18.21
5# Glass/Plastic	34.50	27.17	42.67	26.14	18.96	20.95	30.52	13.77-50.00	29.16	5.83	29.05	28.18
1# Cream	9.50	8.44	8.00	9.26	8.25	10.29	14.00	6.00-16.00	9.59	9.59	10.66	9.82
1# Cut Comb	12.50	11.25	10.74	11.83	10.00	13.45	13.45	6.00-24.00	11.89	11.89	13.00	11.99
Ross Round	9.50	7.50	11.24	12.00	11.24	11.00	15.00	7.00-15.60	11.18	14.91	10.77	10.02
Wholesale Wax (Lt)	6.50	5.95	6.00	6.72	6.67	4.90	8.33	3.00-11.00	6.70	-	6.56	6.61
Wholesale Wax (Dk)	4.50	4.88	4.52	5.70	5.46	3.00	5.46	2.00-9.00	5.41	-	5.51	5.10
Pollination Fee/Col. 200.00	70.83	80.00	91.67	80.00	91.94	50.00		50.00-150.00	83.89	-	87.17	86.22



Coming Up **Work To Do**

It is next month already. How did that happen? We only have a few things to think about, a pandemic, social inequality, the economy, work and occupations plus important others. Aren't we glad we can escape for a few minutes and build a relationship with an insect, the honey bee. This unique insect that has a positive relationship with the environment. It helps environmental health, offers key plant reproductive assistance, provides food for many other creatures as it supports plant growth and it is patient with another species of animal who puts it in a box, feeds it unnatural foods, and doesn't allow it to build free form comb. But, if the human is doing hers/his job the human also provides essential care for it to stay alive and active and healthy by controlling Varroa mites, SHB, AFB, EFB and many other pests, parasites and diseases. As a reward if we are doing our job we get the taste of flowers . . . called honey. The taste of Summer. The reminder of Summer. All provided by the Honey Bee as she is preparing always for Winter when there are not flowers, or pollen or nectar to survive until next Spring. Liquid stored honey is the food of Summer for a honey bee colony in those dark days of Winter. As flower growth is peaking in late Summer so is the collection of nectar from those flowers. And in many parts of the U.S. August/September is the marker for the oncoming Fall season. It is time for us beekeepers to really be active and concentrate on being terrific beekeeper managers. If you aren't paying attention in August for NEXT MONTH you are automatically making a decision to put your colony (ies) under stress as they start replacing the Summer workers with long live Winter workers. Here are the directions from our reporters in your region on how to be successful i.e. keep your honey bees alive over the next many months.

Region One

- Make sure there is plenty of honey storage space
- Sample for mites and treat (All 27 region 1 reporters)

- Verify overall health
- Feed if necessary if you took all their honey
- Requeen now to have young queens going into Winter.

Region Two

- Remove surplus honey
- Sample for mites and treat (All region 2 reporters)
- Feed if necessary
- Replace queens if over three years old.

Region Three

- Sample for mites and treat (All region 3 reporters)
- Feed if necessary
- Place SHB traps in colonies
- Remove honey supers and store properly
- Check queens

Region Four

- Sample and treat for mites (All region 4 reporters)
- Feed if necessary
- After goldenrod flow put feeders on light hives
- Combine weak colonies or make Winter nuc with new queen

Region Five

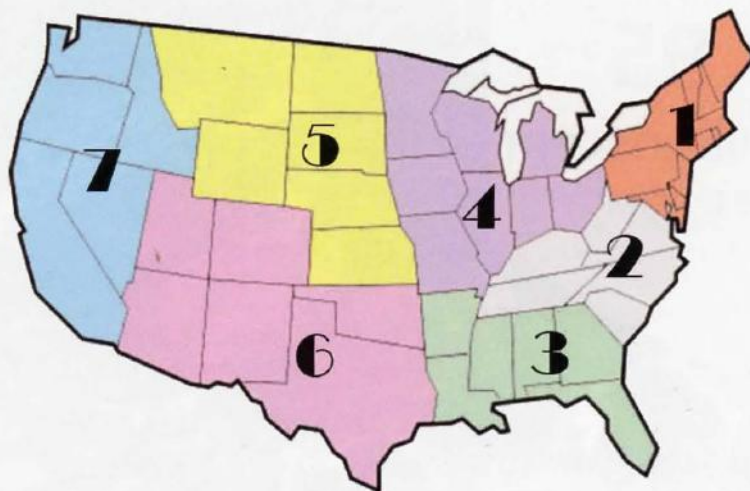
- Check queen vitality
- Sample and treat for mites (All region 5 reporters)
- Feed if necessary

Region Six

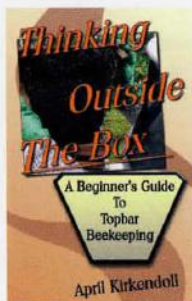
- Sample and treat for mites (All region 6 reporters)
- Feed if necessary
- Combine weak hives install new queen

Region Seven

- Feed, feed, feed
- Sample and treat for mites (All region 7 reporters)



Never Stop Reading



Thinking Outside The Box. A Beginner's Guide To Topbar Beekeeping.

By April Kirkendoll. Published by Lysmata Publishing, Georgetown, Florida. ISBN978-0-9667784-9-6. 5.5" x 9", 256 pgs., soft cover, B&W. \$18.95.

She's a little edgy, this author. Oh, it's topbar hive, top bars are part of a frame. Topbar is a type of hive. Then, it's honeybee here, not honey bee, because, she says, most people think of honeybees when they think of bees. And, it's her book, deal with it, OK?

The difference between a Langstroth and topbar hive, somebody said, is that with Langstroth hives, you work your bees, and with topbar hives you work with your bees. White boxes mean micromanaging. Topbar hive management is more bee oriented, and over all the bees are in charge.

Problems? A few. Not as much honey and more steps to harvest, and they are more difficult to move. Advantages? Well every topbar hive user will tell you they are more natural to the bees than a tall hive and there's essentially no heavy lifting or bending. Plus, when you examine a Lang hive you take off the whole roof, which can really upset the bees (sometimes), and disrupt the brood nest temperature regime. With topbar hives, you only open up a space as wide as only one or two top bars.

She has, right off, a very, very good piece of advice about online videos however. The internet, she says has lots of videos on topbar beekeeping, but remember, she cautions, there is at least twice as much junk as there is useable information out there. And, it seems much of it is just sort of a selling- my-way, or my stuff rather than just the facts. And that kind of sums up a lot information you'll find there.

A dozen pages in bee biology follow with a few photos. A good summary, but not much detail. But to get started with bees, how much do you need? Take a class. There's three times as much space used on now to build a topbar hive as there is on biology. The most detailed section is on management – getting started, growing, moving combs, Fall and Winter (slowdown time) and Spring (speed up time). Bee-Mageddon covers mites, beetles, wax moth, GMO crops, systemic pesticides and even climate change – something that's getting more attention, finally. The rest of the diseases get a nod, but not much attention because if you keep your bees healthy, they'll be OK. She brings in the other topbar authors, so knows about them and advises reading those, too. This should be one of the books topbar beekeepers should read, but you'd be caught short on a few things if it was the only one. But not too short.

Kim Flottum



Bee Optimism: Translational Research Can Rescue Honeybees And Other Pollinators.

Jay Evans. Published by IBRA and Northern Bee Books. ISBN 978-0-86098-290-6. 6" x 9", 140 pgs. Soft cover, color. \$22.95

Dr. Jay Evans, Research Leader USDA Honey Bee Research Lab, Beltsville MD, writes a monthly column for Bee Culture Magazine called Found In Translation. He started a few years back when I was Editor here, and I found his articles interesting, easy to read, and popular with our readers. So what he's done is to take 34 of those articles and tweak them, update some or a lot, and gather them into five chapters, with each chapter containing a collection of related articles, giving each a sort of different focus.

The five chapters are Challenges and Opportunities, Sweetness and Light, Royal Decrees, Climate Change (there's that topic again) and Closing.

Challenges looks at issues surrounding viruses and their mutations, Sammy Ramsey's work with fat bodies, Stress and how it challenges the immune system, behaviors, and shortens life, following foragers with RFID tags, probiotics, and nosema, and pesticides. It covers a lot of what is troubling our bees and beekeepers at the moment.

Sweetness and Light is about honey, mostly. Pollen DNA ID for honey, early harvested vs. late harvested honey differences, propolis and health, and a bit about soybean pollination.

Royal Decrees looks at queen replacement, effects of mites on queen development, larvae choices by the bees when replacing a queen and a look at how solitary bees handle all this.

Climate Change covers a lot of topics you probably don't consider very often. He looks at the historical record of weather patterns and compares these to honey production and overwintering success in various arts of the world. The effects of rain, temperature can be predictive of losses next Spring. And he looks at the superorganism of a whole hive in response to these events, not just individual honey bees. And stresses from habitat climate and disease stresses combined over long periods of time, and he takes a look at long time pollen collection, diversity and what can be learned from these studies. He uses a phrase here that I found interesting. With all this, scientists are looking for Signals In The Noise. Exactly.

But he is optimistic – lots of new beekeepers and lots of new researchers. New methods, treatments and diagnostics in the works. Grand new collections of data, available in the cloud from individuals, from colony level studies, data collection organizations and research, available to decipher some signals in the noise. I was lucky to have Jay approach me with his idea for his column, and wise enough to say yes.

We are smarter, and better because he raised his hand.

Kim Flottum



NEW

Russian Honey Bees. By Thomas E. Rinderer and Steven E. Coy. Published by Salmon Bayou Press. ISBN 9781655328138. 211 pages. 6" x 9" soft cover, black and white. \$39.95 Available from Amazon.

Dr. Tom Rinderer was the Research Leader at the USDA Bee Lab in Baton Rouge in the early 1990s when he and scientists from that lab traveled to Russia to examine honey bees from the Primorski region in the far east. Dr. Victor Kuznetsov, from the Far-Eastern Branch of Russian Academy of Sciences, was the main contact for the project. They visited many apiaries there and elsewhere in the region and measured levels of *Varroa* infestation. Russian beekeepers were not very concerned about *Varroa* and used little chemical control. Meanwhile, honey bees in the US were being devastated by the pest, and extensive chemical control was being used. Russian queens were finally allowed into the U.S. under quarantine

In 1997. They were monitored for mites and diseases, defensiveness, and size, and allowed to increase. After being released from quarantine, eventually a side by side trial of these bees compared to U.S. produced bees was conducted and all metrics were examined and compared – build up, *Varroa* infestation, overwintering and honey production among the many traits being looked at. From these several of the best lines of the Russians were chosen and commercial queen producers began raising crosses of each of the lines they were responsible for. VSH behavior was certainly one of the measures, while other traits were measured also, but it finally came down to basically honey production. The healthiest bees produced the most honey.

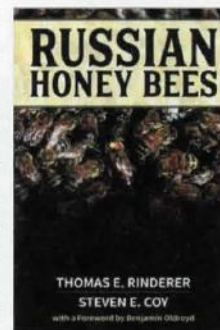
Now available in commercial size in the U.S. and Canada

Commercial beekeepers who have been using HiveAlive will be delighted to know that it is now available in a larger container size. The 2.64-gallon (10 litre) bottle has just been launched in the U.S. and Canada and feeds up to 1000 colonies. HiveAlive is the #1 feed supplement for honey-bees worldwide and has been fed to over six million colonies.

"We have had high demand for the commercial offering in territories like New Zealand, Australia and Europe. Having received many requests from beekeepers in the U.S. and Canada looking for HiveAlive in larger bottles, we are happy to finally launch it now", says Dara Scott, creator of HiveAlive. Beekeepers who have been using HiveAlive in the U.S. and Canada cite increased yields and improved survival as the main benefits of feeding. It also prevents syrup from fermenting. HiveAlive is the only feed supplement with published proven long-term

The Russian Bee Breeders Association was organized shortly after this and the Baton Rouge lab scientists continued to monitor the genetics of each of the breeders that sell the Russian bees. Stock certification is determined by measuring the probability that any given colony is Russian or not. A measure of 70% or higher is required for a breeder to claim the queens do in fact produce colonies that exhibit the qualities of Russian bees sought after by customers. Dr. Rinderer provided most of the genetic information for this book, and Steve Coy, a commercial honey producer in Mississippi described in detail the management techniques used to get the most out of the Russian qualities. Management of Russian bees requires a somewhat different calendar, but is not exceptionally different. If a small cluster overwinters, it will expand rapidly when pollen becomes available, and they will swarm earlier than most bees in the U.S. south, but later in the north. With nectar or pollen dearths they will quit raising brood producing a natural *Varroa* control period. They are managed best in eight frame hives as they expand faster in an eight-frame box. Chapters include basic *Varroa* biology, early history and importation, development of the several lines that are each managed and then crossed, and mechanisms of resistance. There is a lot of information on management techniques for both honey production and pollination, and good information on the Russian Bee Breeders Association. Unique for this book was that Tom wanted to make sure the reader had access to all the science that went into this project, so references and research results are at the front of each chapter, to make sure you are aware of where the information came from, and from who. The Russian Bee Breeders Association cannot produce enough queens to satisfy demand every year, which points to their popularity. As a result, there are some producers who purchase Russian queens, then allow offspring to mate with local drones, producing hybrid Russians. These may, or may not, provide the qualities that Russian queens will. Know your producer.

Kim Flottum



data (published in the Journal of Apicultural Research). HiveAlive has also started distributing all sizes of HiveAlive to U.S. and Canadian retailers and customers directly, which will mean improved customer service. So, whether you need the smallest bottle to feed 10 colonies or the largest to feed 1000, visit usa.hivealivebees.com to find your local retailer or to order directly. If you are interested in stocking HiveAlive in your store, please email hivealive-sales@advancescience.com





Inbox Outreach

The University of Minnesota Bee Squad has their finger on the pulse of the general pollinator zeitgeist. How? We read emails. Everyone sends us emails. Beekeepers, bee advocates, bee haters: we read and respond to all of them. Communicating science-based pollinator information is our job, and we take it seriously. Bee Squadders are paid to stay up-to-date on research and to study wild pollinators so we can address a breadth of bee-related concerns. (We draw the line at answering non-pollinator related concerns, like whether you can safely eat worm infested mushrooms.)

As a beekeeper, you automatically become an ambassador for pollinators, and friends look to you to answer their stinging-insect questions. We thought we'd share a few common questions, to help you talk to your neighbors, communities, and other beekeepers.

Question: Where did my bees go?

One of the most common emails we get goes something like this: "My bees disappeared in the Fall (or Winter) and I can't figure out why. They had plenty of honey and the colony was my best Summer performer." The answer is most often that they died of mite-vectored viruses. The myth persists amongst backyard beekeepers that you can visually see if your colony is overrun with mites. In reality, seeing one mite on a bee--or seeing any signs of deformed wing virus or parasitic mite syndrome--means your colony is already above a treatment threshold and severely damaged, if not dead (Lee 2018).

Check out this site for an abundance of education regarding death by *Varroa*: <https://pollinators.msu.edu/keep-bees-alive/>. Use the Honey Bee Health Coalition's *Varroa* Management Decision Tool for help with management: <https://honeybeehealthcoalition.org/>



Varroa can be hard to count when Summer bee populations are high and there is a lot of sealed brood in the colony. Photo credit: Judy Griesedieck

varroatool/ and please report your data to www.mitecheck.com.

Question: My honey is funny.

Some people get concerned when honey changes texture, and worry it has gone bad. Here in Minnesota, honeys crystallize pretty fast (some of us prefer crystallized honey anyway). We share the National Honey Board's website (www.honey.com) for honey questions as well as recipes and educational materials for kids.

Question: More honey for me?

On the other hand, many beekeepers ask whether you can eat honey from a dead-out. This is an emphatic NO. While technically honey can last forever and can be eaten straight from an ancient Egyptian tomb, eating honey from a dead-out is not a good idea. Brood nest honey is stored in wax cells that have previously been brood cells. Sometimes there is bee poop on those frames, or mold, or pesticides from mite treatments and contaminated pollen (Mullin et al., 2010). Mice and other vermin often visit dead-outs and could contaminate the honey. We do feed dead-out honey to bees, as long the frames are free of brood and spores from American Foulbrood. Dead-out honey should be stored where it can freeze, or at least stay

sealed from mice. Honey for human consumption should be extracted from frames where no brood has been reared.

Frantic Question: Oh No! I've got bees!

Our most popular question is about bee removal. People email us when they find bees or wasps on their properties, asking us to relocate them. Usually, people have found bumble bee or wasp nests. This is our chance to talk about the benefits of wasps (pest control) and the importance of native bees. After we share information about the species' life cycle, and the relatively low threat of whatever pollinator they have in their yard, many people are willing to leave the nest alone until they naturally die off in the Fall. Occasionally, people do find honey bees that have taken up residence in an unusual place. A local beekeeper can often be convinced to



We receive many emails regarding unwanted honey bees. Photographic evidence rarely points to honey bees (usually they are wasps or bumble bees), but sometimes we are surprised. Photo credit: Farmer Keith Johnson

remove them.

Question: How can I help bees?

Some people want to help bees by becoming beekeepers, and others want to know what to plant for bees. We underline that planting flowers is the best way to help bees, and that becoming a beekeeper is a lot of work! For those who want to make the leap, we direct them to beekeeping clubs and mentorship that will give them a proper start. New beekeepers (and their bees) benefit immensely from following an experienced, successful beekeeper.

As far as flowers go, we focus on planting for diverse bees, not just honey bees. In particular, we point people to plants that provide wild bee habitat as well as early and late season food for all bees. We share this habitat assessment guide, which the lab developed in collaboration with Xerces. <https://xerces.org/publications/habitat-assessment-guides/habitat-assessment-guide-for-pollinators-in-yards-gardens> This is a great tool for optimizing pollinator friendliness in different landscapes.

Planting guides and bee management support will differ depending on your geographic region. Please reach out to your regional beekeeping clubs, universities and horticultural experts for pollinator resources!



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Acknowledgement

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Becky Masterman led the UMN Bee Squad from 2013-2019 and currently alternates between acting as an advisor and worker bee for the program. Bridget Mendel joined the Bee Squad in 2013 and has led the program since 2020.

DELICIOUS HORNETS

Kathy Keatley Garvey

So says UC Davis-trained entomologist Matan Shelomi, assistant professor of entomology at the National Taiwan University in Taipei, Taiwan, whose course on “Edible Insects” is the largest in his department.

Shelomi, a graduate of Harvard University, holds a doctorate in entomology from UC Davis, where he studied with major professor Lynn Kimsey, who directs the Bohart Museum of Entomology and serves as a professor of entomology in the Department of Entomology and Nematology.



Dish featuring the pupae of Asian giant hornets, aka “murder hornets.” (Photo by Matan Shelomi)

Shelomi recently posted an intriguing comment on the Facebook page, Is This a Murder Hornet?

“More like delicious hornet,” he wrote.

Asian giant hornets, sensationally nicknamed “murder hornets” by non-entomologists, continue to grab front-page headlines. The first colony detected (and eradicated) in North America occurred last

September on Vancouver Island, British Columbia. Then a single a dead one was found in Blaine, Wash., in December.

The world's largest hornets (they can measure approximately 2" in length), they attack and kill honey bees and feed the remains to their young. They can decimate a hive. Thus, beekeepers worry that AGH will invade North America, become established, and cripple the apiculture industry. The Washington State Department of Agriculture and Washington State University Extension are asking residents to keep a lookout for them and report any sightings.

The newly acquired nickname, “murder hornet,” triggers fear. But amid the panic, terror and near hysteria, it's important to point out that there is NO national invasion and they are NOT coming for us.

This insect was previously known as the Asian giant hornet or AGH before the BBC, the New York Times and other media labeled it “the murder hornet.”

UC Davis distinguished professor Walter Leal, who studied and worked in Japan, and speaks Japanese, says someone's mistranslation of Japanese research led to “yellow” translated as “killer.” Leal told us: “The Asian giant hornet, *Vespa mandarinia*, is called “Kiuro Suzume Bachi (キイロスズメバチ)” in Japanese. It injects its venoms, sometimes inducing severe anaphylaxis. The translation is incorrect. Kiuro means yellow, but it was translated as “killer.”

Indeed, the BBC report on May 4 managed to insert “coronavirus,” “murder hornets” and “terror” in the same

Taste Like French Fries



Entomologist Matan Shelomi

sentence. The Lede: “Even as the US remains under attack from the coronavirus outbreak, a new terror has arrived: ‘murder hornets.’”

Not “murder” hornets to Matan Shelomi: “Delicious hornets.”

On the newly created Facebook page dispelling the myths and misinformation about the giant hornet, Shelomi posted photos of *Vespa mandarinia* larvae and pupae dishes, “raw and fried, from a small restaurant in Hualien in eastern Taiwan. You can also find it in the Huaxi night market in Taipei, if it's in season.”

“Several bee and wasp species have edible brood, which can be fried, steamed, roasted, cooked with soy and sugar, or eaten raw,” Shelomi wrote. “Even honey bee brood is edible! While it's not exactly commonplace, Asian giant hornet has been or is still consumed in parts of China, Japan, Taiwan, and northeastern India.” (Source: “*Edible Insects of the World*” by Jun Mitsuhashi)

“To get the brood, you must harvest the nest. ‘Isn't that dangerous,’ you ask? Yes, in the same way extracting honey is dangerous. Stay safe by collecting at night when they are resting, using smoke to pacify them, and wearing protective clothing. To find the nests of edible wasps, Japanese harvesters tie a cotton ball to a piece of fish meat and present it to a female wasp. She will carry it home, and you can follow her to find the nest! That's a bit harder with the giant hornet, as they can travel 2km on their foraging runs. They are not exactly rare in East Asia [for now], so those in the know can find nests easily. A helpful trick is to harvest the adults first. At night, knock down the nest, put a big bowl of rice wine in front of the entrance, and shine a bright light. The wasps get stunned by the light and Fall into the wine. You can then harvest the adults and steep them in wine to make a medicinal alcohol, and take the brood as a snack. Who's murdering who now!”

“In case you were wondering, fried murder hornet tastes like French fries: if you can eat a potato, you can eat a pupa. That said, if you are allergic to shellfish, you may also be allergic to insects and should not consume them.”

“Oh, and insects cannot get any coronaviruses, so don't worry about that either. Save a pangolin; eat a wasp.”

Shelomi's post prompted Facebook member Geevee Snow of Brooklyn, N.Y., to comment: “My stomach just growled.”



Dish featuring the larvae of Asian giant hornets, aka “murder hornets.” (Photo by Matan Shelomi)



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HONEY BEE FACT #72

By John Martin

QUEENS MAY MATE WITH UP TO 17 DRONES OVER A 1-2 DAY PERIOD OF MATING.

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Bee Vet

What's Coming

Tracy Farone DVM

Emerging Disease in the Shadows, Tropilaelosis:

Zoonotic Disease and Public Health is a course I have had the joy of teaching to pre-health students for over 10 years. The course's content covers all types of infectious diseases and how they affect and connect humans, animals, and the environment. Some of my students affectionately call it "Zoo" or even the "poo" class, because so many diseases can be transferred through fecal/oral contamination. Eww, but true! Many students are amazed to discover how many diseases surround us, how the health of our world is so interrelated, and under normal circumstances, how most of us are blessed with a wonderful immune system. Certainly, these same observations apply to honey bees and their health.

Emerging infectious diseases is one topic we cover during the "zoo" course. Emerging infectious diseases are infections that have recently appeared in a population of humans or animals. Emerging diseases often arise



Danger emerging from the shadows....

when they are brought into new geographical ranges and/or species. Some causes of emerging disease may not have been previously known, while others may already be known, and pose a serious threat, if they are able to increase their geographic range. Ebola, Zika, Rocky Mountain Spotted Fever, Varroosis, and COVID-19 are all examples of emerging diseases. Many emerging diseases often originate from "foreign" or "exotic" diseases (or newly named "transboundary diseases"). Foreign, exotic or transboundary diseases are diseases that naturally exist in a certain country, continent, or areas of the world, but may cross borders, continents and/or oceans to infect new regions. If allowed to move into new geographical areas, foreign diseases can emerge in a population with little natural immunity against the disease agent. Therefore, these diseases can cause high morbidity and/or mortality when introduced to the new population of animals or humans. In our modern world, international trade and travel often accommodates hitch-hiking diseases and

pests. To safeguard animal health in the US, a list of foreign animal diseases (FAD) is continuously monitored by the USDA and accredited veterinarians.

But what about bees? Do they have a current "FAD"? They do. It is a parasitic disease of honey bees that does not always make the headlines, but mirrors examples of other disease processes we see highlighted in our world. No, it is not the "murder" or Asian hornet, but a disease that is and should be on beekeepers', entomologists' and veterinarians' radar: Tropilaelosis.

Tropilaelosis is a mite infestation of *Apis mellifera* (European honey bee) caused primarily by two major species: *Tropilaelaps clareae* or *Tropilaelaps mercedesae*. These mites' natural honey bee hosts (*Apis dorsata*, *Apis laboriosa*, and *Apis breviligula*, "giant" honey bees) are better adapted host species of honey bees compared to *Apis mellifera*. Their natural range is found in Asia, Indonesia, and the Philippines. The mites have also been reported in parts of Africa, including Kenya and the Republic of the Congo. Tropilaelosis is currently a disease regulated world-wide and monitored by the OIE (The World Health Organization of Animals) as a notifiable disease and the USDA as a reportable disease. These mites are one reason why honey bee importation is limited in the US.

The lifecycle of the mite is somewhat like *Varroa* with the reproductive cycle involving a gravid foundress mite invading a brood cell, egg laying, developing mites parasitizing and often killing the larvae/pupae, and re-emergence of new adult mites. Compared to *Varroa*,



Tropilaelaps can be transmitted through swarms. Credit to Deidra Ressler.

the reproductive cycle is relatively short, only about one week, and all mites emerge from the brood cell including the males. This feature allows the *Tropilaelaps* mites to populate a colony much faster than *Varroa* and therefore,

take down a colony quickly. *Tropilaelaps* mites are unable to feed on adult bees, so their phoretic phase is much shorter than *Varroa*, usually only three days. This characteristic forces the mites back into the brood for yet another quick reproductive cycle, killing more brood and making more mites. Despite the short phoretic period, adult bees are still able to spread mites to other hives via swarms, package bees, exchange of frames of bees between hives, drifting, and robbing.

Mites are diagnosed and treated using similar methods to *Varroa*. Adult honey bee samples can be checked for mites with alcohol wash or sugar roll. While mite count levels have yet to be established for *Tropilaelaps*, any mites found would be significant. The mites are visible with the naked eye, but they are smaller and move faster than *Varroa*. They are easier to observe in capped drone brood. Sticky board or “bumping” frames to dislodge mites onto a white surface can also be used for detection. At the colony level, infestations will result in rapid colony collapse or absconding. Brood comb may be severely affected due to high mortality infected larvae and pupae. Treatment should involve an IPM approach. Treatments can include common acaricides used for *Varroa*, along with biological controls of inducing brood breaks, brood removal and caging the queen. Treatment timing protocols should consider the short phoretic period of the mites. Being unable to parasitize adult bees is one biological weakness of *Tropilaelaps*, that we can exploit. Natural broodless periods and overwintering are ways to limit or control these parasites. Luckily and so far the geographic range of *Tropilaelaps* has largely been limited due to this “tropical nature” of the mite. However, some honey bee colonies in South Korea, with a more temperate climate, have been found to support *Tropilaelaps* mites.

There is more bad news. While rare, *Varroa* and *Tropilaelaps* can co-infect colonies, but *Tropilaelaps* usually out competes *Varroa*. *Tropilaelaps* has also been found to be a vector for viruses, like DWV. The good news: *Tropilaelaps* has not yet been reported in much of the world, including the US, Europe, Australia, and Canada. However, awareness and prevention of diseases are keys



to keeping our honey bee population safe. How diverse animal species, humans, and diseases can be, yet how much is still shared and

interconnected, amazes me. Studying and understanding these similar biological and epidemiological principles are paramount to understanding how we can all work together to best promote our collective health. 🐝

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Tropilaelaps info sheet:

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USDA national honey bee survey information including surveillance for *Tropilaelaps*:

https://www.aphis.usda.gov/plant_health/plant_pest_info/honey_bees/downloads/SurveyProjectPlan.pdf

USDA reportable bee diseases:

https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/monitoring-and-surveillance/animalhealth/status-reportable-disease-us/lut/p/z/1/IzJNU4MwEIZ_Sw8cIRvaodQbIFNQQGMtirlogqbADCVMEmT015vWkx9tMzD8zPPuZt9dRF COSEvf6pKqmre00fdn4mxXOFiCO8PJMrzG4EWL-DaaOwD3Nno6AsndLMD-A-g99MEL1MODGMb8BSR_-kfi0frN9lm5WI_9HBieTBOfwYg58PfxEQgHbRFgqQIih1VIVm3O45ySbctraTUVJ0VVL03BOi4ULRpmvtaSUcnMXurfkWP8U_6u7QvAoQE_gN8Oj6ixbHjxNQ5eW0xdXYzgOyaYsHqhnyulOnllgAHDMFgl52XDrBe-N-AvScWlQvl3EnX7LMvyjySCOjzJ8T54k8knxy1G5g!/#bee

OIE interactive map of reportable animal disease distribution around the world:

https://www.oie.int/wahis_2/public/wahid.php/Diseaseinformation/Diseasedistributionmap?disease_type_hidden=&disease_id_hidden=&selected_disease_name_hidden=&disease_type=0&disease_id_terrestrial=181&species_t=0&disease_id_aquatic=999&species_a=0&sta_method=semesterly&selected_start_year=2018&selected_report_period=2&selected_start_month=1&date_submit=OK#

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Great article with *Tropilaelaps* on comb video:

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Acknowledgements to my research students for research assistance: Katrina Bailey and Deidra Ressler.

Pollination

The Agreement Between Two Species

Dr. Christine Bertz



From a plant's point of view, honey is irrelevant. This prize of so many beekeepers -- the result of a lifetime of labor by thousands of individual bees -- is merely an incidental side effect, from this perspective. All that concerns a plant (if a plant can be said to be concerned about anything at all) is the need to lure over an insect to move its pollen from one flower to another. Without

plant. This means plants need a method to move pollen around.

Some plants enlist the wind for this task. In some ways this seems like the economy option, since there's no need to grow showy, scented flowers or make nectar to reward visiting pollinators. But instead, these plants invest their energy in producing copious amounts of pollen, since to get to another plant



[https://commons.wikimedia.org/wiki/File:Grey-headed_Flying_Fox_\(IMG0527\).jpg](https://commons.wikimedia.org/wiki/File:Grey-headed_Flying_Fox_(IMG0527).jpg)

of the same species, it has to get absolutely everywhere. And (to our regret) it does. As a result, wind-pollinated plants, including birch, oak, pine, and grasses, are responsible for many of our most aggravating seasonal allergies... as well as an excessive number of trips to the car wash.

Fortunately for those of us with allergies, these plants are in the minority. About 80% of flowering plants are pollinated by insects and

other animals (birds, bats, and even a few mammals and reptiles). Recruiting these couriers comes with a metabolic cost, since plants must invest energy and resources in both nectar and the flowers that advertise its presence. But in return, plants gain a much more strategic delivery system. Not only do these plants need to make less pollen, but they can advertise for a specific type of pollinator -- one that is likely to visit other flowers of the same species. For example, night-blooming flowers are typically large and pale, and are a sign that a flower is moth-pollinated. Twisty, contorted flowers like



Dutchman's pipe is a striking plant and the "gross factor" of flowers that smell like rotting meat is always appealing... right? Photo credit: https://www.flickr.com/photos/adam_skowronski/41220248770

that need to employ the world's tiniest courier service, plants would not produce nectar -- and honey would not exist.

As anybody who's ever planted the eye of a potato knows, plants are very good at reproducing without any need for pollination. But this clonal growth -- asexual reproduction, in technical terms -- doesn't produce any genetic variation, and in the long-term, leaves plant populations less adaptable and more vulnerable to pests and disease. Sexual reproduction, and the diversity it yields, makes plant lineages more successful and more adaptable, but this requires fertilization. Plant sex is, by all accounts, strange and complex, but the first step is simple: the delivery of pollen to a flower -- preferably a flower on a different



Photo by Zdeněk Macháček on Unsplash

Dutchman's pipe attract fly and beetle pollinators, and often produce a scent like rotten meat to do so. (The titan arum, nicknamed the corpse flower for its putrid smell, is another well-known example of a fly-pollinated plant.) And many bees, including the honey bee, are attracted most strongly by brightly-colored flowers with open or bowl-shaped petals that can serve as a landing platform.


Turnabout is fair play: From a bee's perspective, pollination is meaningless. The transfer of pollen from one flower to another is accidental, like spilling water from a bucket or tracking mud into the foyer. A bee's priority is fulfilling its dietary needs. For the honey bee in particular, the sugars in nectar provide the colony with its main source of carbohydrate, while pollen contains a smorgasbord of carbs, protein, fats, vitamins, and minerals. The composition of nectar and pollen varies among plant species, a fact that is no surprise to any beekeeper. Honey color and taste varies with location and season, and bee bread made from different types of pollen

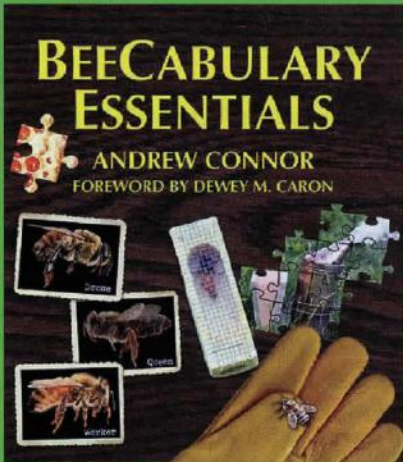
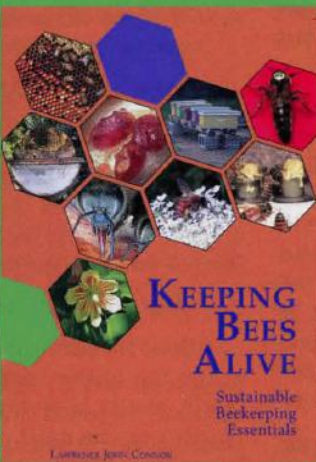
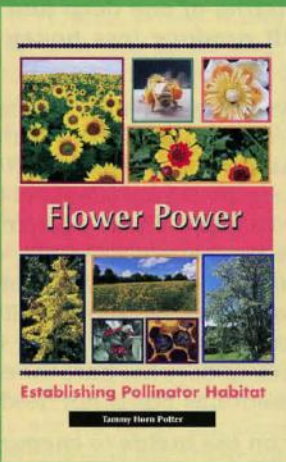
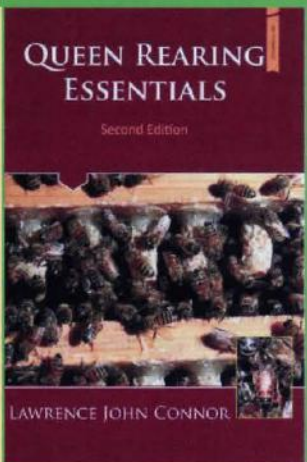


Photo by Jerry Bertz

exhibits an astounding array of colors. It should come as no surprise that this variation also represents a difference in nutritional content. (Research has shown that bees with access to variety in their pollen diet are healthier bees.)

Despite the selfish motives of plants and the pollinators, this mutually beneficial arrangement has produced many partnerships over time, with some co-evolved plant-pollinator pairs relying solely upon one another for their needs. The adaptable honey bee, in contrast, is a generalist that will feed from, and can pollinate, many types of flowers -- a skillset that endears it to us greatly. The honey bee's unique characteristics provide us with an efficient, transportable pollinator that is crucial to our current agricultural practices, even if this is not what the bee intends. Similarly, the need of plants for a pollen courier has -- just incidentally -- given us one of mankind's first and most important sweeteners.

Pretty impressive work, for a process that neither the plant nor the bee sees in quite the same way. 

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11 Tenants For Success

David MacFawn



Dr. Tom Seeley, professor at Cornell University, has made 14 suggestions to improve colony performance based on what he has found with wild colonies (see the final chapter in his book, *The Lives of Bees*).

These suggestions are currently being implemented in the Columbia, South Carolina, area but we have found trade-offs need to be made. This article discusses our progress to date and trade-offs made.

1. Space the colonies as widely as possible; the average number of colonies in the wild is 2.5 per square mile;

The Congaree River basin is largely swamp. This makes it nearly impossible to do bee lining and determine the colony density in the area. Dr. Tom Seeley indicated, "I think wide colony spacing is for bees like clean air is for us: something that is healthful, but not essential, for survival. In the Congaree River beeyard, two hives were placed on an eight-foot landscape timber on top of three cement blocks. The eight-foot landscape timber hive stands were spaced approximately five to ten feet apart facing different directions.

2. Use small hives consisting of one deep and one shallow; colonies will produce less honey but will be healthier

Wild colonies average five to eight combs. The eight-frame equipment was used as a trade-off between ten-frame equipment and five-frame NUCs. Five-frame NUCs take more management to keep from swarming and help survive the Winter. Also, with eight-frame equipment, the brood nest is mainly in the bottom deep box with the nest expanding up into the medium food chamber during intensive Spring brood rearing. This results in pollen storage around the brood nest in the upper food chamber. Eight-frame equipment does not have the extra space that ten-frame equipment has but is not needed.

3. Use rough-cut lumber on the inside to encourage an increase in propolis coating

Allen Johnson and Robert Abshire (johnsonsbeesupply.sc@gmail.com) in Williston, South Carolina, custom made eight-frame brood chamber deeps and medium supers out of dimension rough-cut yellow pine lumber. The dimensions of rough-cut lumber are variable, so they made sure the inside dimensions were correct for a standard eight frame hive. This resulted in some outside variable dimensions. The equipment was glued and nailed. We replaced all the hive equipment with this rough-cut dimension lumber as of February 2020. Rough-cut equipment is its own type similar to commercial-grade equipment. Solid bottom boards are used with

the entrance reducer on the smallest spacing, no screened bottom boards. In the wild, trees have "infinite" wood on the top and bottom of the colony resulting in more insulation on the top and bottom than Langstroth hives. Of significant concern is heat loss through the top, so two $\frac{23}{32}$ " Advantech tops are being used with solid board insulation between the tops. The inside roof needs to be kept warm in the Winter so the humidity coming

up from the brood nest spills over to the cooler side and condenses on the sides and not the top. This will keep the moisture from raining down on the cluster in the Winter.

The inside propolis coating will be assessed after one year of equipment use. This assessment will determine what percent the inside rough surfaces are entirely covered with propolis.

4. Target diverse pollen sources for the location as much as possible

A special bee yard location was obtained along the Congaree River, across the Congaree River from Congaree National Park, outside Columbia, South Carolina. This site has a unique warm ecosystem with plentiful Tupelo Gum trees (*Nyssa aquatica*), American Holly (*Ilex opaca*), Sparkleberry (*Vaccinium arboreum*), Tulip Poplar (*Liriodendron tulipifera*), and a large variety of flowers.

5. Maintain 10- to 20- percent drone comb

Deep frames with a one-inch foundation starter strip at the top of the deep brood frames were used. This will result in the bees building comb with an average of 17 percent drone cells. We do have some frames with all foundation/drawn comb that are being transitioned out of the hive.

Foundation usually only has worker-size cells; in the early part of the 20th century it was thought the more workers available would result in more honey. For the most part, this has been found not to be true. In recent years the philosophy has changed to the view that healthy colonies usually produce many drones, but weak colonies usually do not produce many drones. Healthy colonies have more workers.

We will measure the drone comb amount.

6. Obtain and keep bees adapted to your location

This is done by utilizing walk-away splits located in



Figure 1. Rough-cut dimension eight-frame equipment. (Photo Credit: David MacFawn.)

the area/bee yard location we want the bees to adapt to. The half of the walk-away split without the original queen will raise themselves another queen that will be mated locally. If the queen is not healthy or is a poor layer, then the bees may supersede her or the beekeeper can promote this by removing the queen's forelegs or by actually removing the queen. If the queen is removed, a concern is that there are enough workers available to get through the queen transition. Raising and mating queens in the area you want your colonies adapted to will also work.

7. Keep the nest structure intact; the original frame location in the hive and the original frame orientation; do not reverse boxes

Most beekeepers today need to keep the original frame location in the hive and original frame orientation. It is important not to reverse boxes. The brood nest should not be split in cold weather by reversing the boxes. Usually, the queen will go down into the lower region of the hive on her own.

8. Use 2-inch bottom opening; no top entrance

This is easy to do by always using the 2-inch orientation of the entrance reducer. In the wild, there is "infinite" insulation on the top and bottom of the colony. This results in condensation occurring on the frame bottoms and not at the top of the hive. Water/moisture in the Winter is used by the bees rather than having to forage for water in the Winter, or water condensing on the hive top and "raining" down on the colony, chilling the colony in hives with poor top insulation. The hive top will be insulated such that the inside bottom of the cover is warm and the moist air condenses on the hive sides or frame bottoms.

9. Allow condensation during the Winter in hives. This is the Winter water source for the bees

See #8 for an explanation of condensation as a water source for bees in Winter.

10. Do not disturb the colonies in the Winter--no feeding syrup or pollen

By feeding syrup or pollen, a false nectar or pollen flow is created. This makes the bees adapt to this false flow, resulting in the bees consuming more stores, out of sync with nature, and the local environment. If the colony is light in the Fall, then Fall feeding can be done.

11. Refrain from treating for Varroa ; if the level gets greater than 15 mites per 300 bees, euthanize the colony with warm soapy water; eliminate nonresistant colonies and avoid mite bombs

The nectar flow typically starts April 1 in the Columbia, South Carolina, area. We split the end of February at the earliest. If we split the end of February, it means first workers from the queenless split emerge mid-April, with the first foragers typically three weeks later or the first part of April. The flow is over usually the first week in June.

At the end of February 2020, I split all the Congaree colonies (except one) that had at least a full brood chamber

and medium food chamber full of bees and brood. There were enough bees to cover all the brood in both split halves for the cool weather we were going to have for the next week (lows at night in the mid-30s F.). I therefore did individual walk-away splits and did not do over/under splits as I originally planned. There are now nine colonies/splits in the Congaree bee yard. I divided the brood/honey/pollen equally between the splits and made sure there were eggs/young larvae in both splits so I did not worry which split had the queen.

By feeding in the midstate area of South Carolina from the end of February, when some splits are made, until the nectar flow around the first of April, I am violating the no-feeding syrup recommendation. By feeding syrup, I am implementing another false nectar flow, but this is necessary to keep the bees alive. I suspect if I did not feed from the end of February to around April 1 the bees would adapt and start swarming around the first of April. The first year I plan to feed 1:1 syrup until the nectar flow starts the end of March/first of April. After the walk-away split queens have mated locally the first year, the colonies will not be fed the second year. We can treat the high-mite colonies with Mite Away Quick Strips (MAQS) and requeen rather than euthanize. However, note that treating may interrupt the bee gut microbes. The colonies with high *Varroa* mite loads will be moved to a nursery yard.

Monitoring *Varroa* mite levels and treating if necessary is especially important beginning the end of May through November in South Carolina. Mite levels should be monitored at least monthly, if not bi-monthly.

Progress has been made in implementing Dr. Tom Seeley's Environment of Evolutionary Adaptedness (EEA). Some tough decisions need to be made such as feeding and reversing boxes. Colonies that are not adapted will be lost, but splits and queens raised in the local environment will quickly ensure the bees are adapted to the local environment. Consideration initially may be made to feed splits but to allow open mating in the local environment which will help ensure the queens adapt to colonies surviving locally.

We need to consider being able to find an isolated nurse yard to move issue colonies to. I am not sure that some colonies can sustain a higher mite load than others, so there is the issue of mites contaminating other colonies if I do not euthanize them. Also, by using Mite Away Quick Strips (MAQS), I am impacting both good and bad gut bacteria which may be an issue.

It seems most beekeepers trying treatment-free beekeeping only have their colonies last two to three years. We will see how this beeyard in the Congaree Park area survives; yes, I am doing a calculated gamble.



Dr. Tom Seeley's Environment of Evolutionary Adaptedness (EEA) and the Valentine Hive, *Bee Culture*, David E. MacFawn, November 2019.

Deep Forest Bee Hunting Robin Radcliffe and Tom Seeley. *American Bee Journal*, Volume 158, No. 8, August 2018.

Making Beeswax Salves

Alice Eckles

Whether it's for self-sufficiency to make your own health and beauty products for personal use and gifts, or to add to a product to your honey sales, making salves is an easy and excellent use of the valuable beeswax you can accumulate through beekeeping.

If you typically use store-bought lotions you may not be aware of the many benefits of beeswax salves. I was once like that. I originally started making salves because my grandmother made salves, and as beekeepers we had the beeswax. I also thought it would be good for us to have another product to offer at our honey booth. What I've learned is that beeswax salves are superior to lotions and good for a lot more than moisturizing skin.

I developed a recipe for Healing Herbal Beeswax Salve that I make in artisanal batches for Dancing Bee Gardens. By putting samples out at our booth people can try them. I explain that they can be used as an all over moisturizer and because it is infused with certain herbs there are many other healing uses for the salve as well. I use it for almost all my first aid needs. Salves are also very handy for traveling, as a little goes a long way, usually packaged in a 2 ounce tin, and solid so there's no trouble getting through security when traveling by air. Salves are very small compared to a bottle of lotion leaving more space in your luggage for other things.

I have made and used my Healing Herbal Beeswax Salve over the years and have come to know its virtues, from my research and intuition, to customer testimonials and my own experience. While I provide my recipe in this article, do not limit yourself to what I have done. Beeswax can enhance the herbal and moisturizing qualities of whatever ingredients you add. Your creativity and herbal knowledge will expand the opportunities for creating your own recipes and products.

Just as when making mead you can either flavor the drink with fruits, herbs, or spices or you can make a simple mead with only water, honey, and yeast, so it is in salve making. The simplest most basic salve ingredients are:

beeswax and oil. And the process at its simplest is to melt one part of the amount of beeswax into three parts oil in a double boiler, then pour the mixture into containers to cool.

For my herbal salve I use the sun-infused oil method. I begin collecting my herbs near

the end of the Summer when all the different herbs that I like to use are in flower. I gather these, and if they are at all moist I dry them out a bit on a screen. Then I fill a gallon jar with the herbs and pour organic olive oil over the herbs to cover. I set my jar in the sun for two weeks. I push the herbs down so that there are as few air bubbles as possible.

The oils and herbs you choose for your salve will give it the special properties of those herbs and oils. Know your ingredients, and use what you know. You can get ideas by visiting an herbalist, or checking the ingredients in skin products you like and use. Think about what is inspiring you to do this and let your curiosity lead your research into the type of product you want to make. List any problems you want to address with the salve and let that guide your discovery of helpful herbs. I know that castor oil is great for healthy hair growth for example and have made a hair styling salve, with castor oil, beeswax, and essential oils for scent.

To start: Do you have inspiration? Do you have needs that a salve could solve or soothe? If you have decided to make beeswax salve gather all the herbs, oils, and wax that you will need. Make sure you have all your supplies before you start, and make sure they are labeled to prevent any mix-ups. You will need: clean beeswax, olive oil, a jar for solar infusing with herbs if you are doing that, a double boiler, cheese cloth for straining out herbs, essential oils for scent, containers to fill, and labels. Herbs for the most part are best collected and used immediately. You may need a screen for drying them if you can't find a dry time to collect them. See my Herbal Healing Salve recipe at the end of this article. Process your beeswax into clean smaller measured pieces like one ounce or eight ounce blocks.

Next gather the materials you will need. What kind of containers will you fill with salve? Will you make some small test batches and reuse small glass bottles and tins or are you ready to place a big wholesale order for tins from a major company?

The way I like to make salves is to collect the fresh herbs. Most herbs will be more effective if fresh. Calendula is an exception and can be used fresh or dried. By observing the bees all Summer on the flowers you will be aware of what nature is offering and in what quantities and locations. Every year is a little different. Bring a bunch



Herbs in jars ready for oil to be added for solar infusion.



If the herbs aren't completely dry place them on a screen until they are dry to the touch.

of bags and visit locations where your chosen herbs grow. Harvest responsibly, by taking no more than one third of what's available in any one area. Also think of the quality of your herbal salve and don't harvest from contaminated sites. Find a sunny spot to put your jar, and fill it with clean dry herbs. Pour the oil into the jar over the herbs, pushing the herbs down to get out as many bubbles as possible. Your hand is going to be covered in olive oil so you want to be prepared for that with some sort of towel to wipe it off or just run the oil into your bare arms and legs to moisturize. You could use a kitchen utensil to push down the herbs. I like to do this whole process outside because it can get messy. Put the lid on the jar tight and leave the mixture to infuse outside in the Summer sun for two weeks. Could you set it on a kitchen counter or in a sunny window? Maybe, but I've never tried it believing that direct sun is needed. If the herb oil mix doesn't have consistent and significant all over warmth, spoilage can occur. My intuition says no to indoor sun infusion.

After the herbs have infused into the oil by sitting in the sun it's time to strain the herbs out. Begin by stretching the cheese cloth over the opening of the double boiler pot (top part) and secure it with a rubber band around the edge and/or clothes pins. You don't want the cheese cloth to come loose while you're pouring the oil onto it to strain out the herbal material. You can let time do the job or elect to finish up by taking the cheese cloth off the pot and wringing it out so that the oil passes into the pot and the herbs form a clump inside the cheese cloth. The herbs make a great addition to your compost pile. Don't squeeze too hard and end up adding watery herb juice to the oil inadvertently. Water can cause your salves to spoil. If made with care salves can last a year or more. You can add preservatives such as vitamin E or rosemary extract and these can have other benefits as well, but remember there is no water in a quality salve and beeswax is a preservative too.



If producing for the market be sure to weigh out the first one to get the proper file line so it matches the weight on the label before filing the rest.

sunflower oil does not. The proportions are four parts oil to one part beeswax. Melt gently together, if there's anything else such as essential oils that you want to add, Add those when the beeswax has melted and mixed into the oil. Stir gently. I use a Pyrex measuring cup the pour

Ready to finish making these salves? Put water in the bottom of your double boiler. Add ingots or small chunks of clean beeswax to your olive oil. You can choose another type of oil, but do your research to make sure it's what you want. I use olive oil because I believe it's the most stable. I know from experience that

the mixture into my tins and that works quite well. You will want something with a little spout to pour with. Be sure the counter or table you are working on is level but be sure to put newspapers all around on the floor just in case. By leaving a little room at the top of the containers you're less likely to make a mess. Fill the containers and wait for the salve to harden and cool before you put the lids on. Label your product! If you feel unsure of the oil to wax ratio or you want to make your salve softer or harder, simply adjust the amount of beeswax. Use more beeswax for a more solid product and less for a softer salve. To gage the effect of the amount of wax you are adding, you can start with the least amount, add a little more at a time, dropping a drip of the wax-oil mixture on wax paper and putting the wax paper into the fridge for a moment then check the cooled consistency. Keep adding beeswax until you have the consistency you like. You did it!

A resource I would recommend for concise instructions on this and other herbal preparations is *Rosemary Gladstar's Family Herbal, a guide to living life with energy, health and vitality.*

Alice's Healing Herbal Salve Recipe

Harvest the herbs below to fill a gallon jar. The quantity of each herb is listed in order of most to least. Though these herbs have many virtues I selected them for the quality listed after the herb.

- Comfrey- heals muscles and bones
- Calendula - soothing to skin irritations/inflammation
- Red Clover- anticancer, lymph clearing
- Plantain - soothes bug bites
- St. John's wort - heals nerves and skin
- Heal all - heals wounds
- Sage - antimicrobial

- Cover the clean dry herbs in large jar with organic olive oil.
- Let sit outside in the sun for two weeks.
- Strain herbs out with cheesecloth.
- Ideally let the infused oil sit and settle for a day before starting production.
- For each cup of oil add ¼ cup of beeswax and melt together in a double boiler.
- Add a tablespoon or two of vitamin E.

When everything is melted just before you're ready to pour you can add lavender essential oil, two tablespoons, for a pleasant scent. Pour the mixture into tins and label when cool.

I usually make a gallon of oil at a time. To this I add three 8 ounce chunks of beeswax. Half of the mixture I use for unscented salves. Only to the remainder do I add the 2 tablespoons of lavender essential oil. Makes about 50 tins, 2 oz each.



Alice Eckles is the author of The Literature Preferred by Wild Boar, a novel. While she sometimes assists in beekeeping, she mostly handles the value added parts of the beekeeping business she shares with Ross and works at her own artist business AliceEcklesStudio.com.

OUT OF THE PAST

The Representation and Symbolic Meaning of the Honey Bee through Time.

Isabelle Hopkinson

From the Greeks to the Egyptians, from Napoleon to the Mormons, and Karl Marx to the City of Manchester, the bee, and more specifically the honey bee, has been a persistent and recurring image throughout human history. Following the Manchester bombing attacks in 2017, the image of the bee became a defining symbol to reflect a collective show of solidarity to the tragedy. In fact, the bee had long been an emblem for Manchester, symbolising the city's industrial past when workers were dubbed "busy bees". The crest on the City's arms include Seven bees.

Prior to going to University to study anthropology, I became interested in the way in which the bee has been used and represented in different cultures and societies through time, the reasons why and the meaning given to it, which I hope to reveal in this short article.

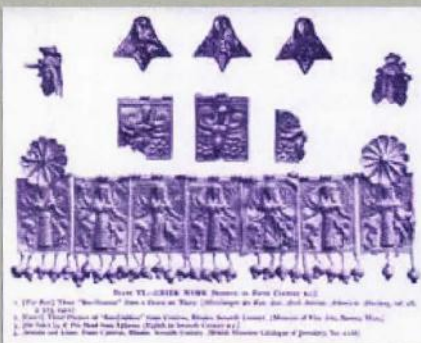
The Bee in Ancient Greek society (2000-300 BC)

Bees and honey were a major and persistent symbol in ancient Greek culture and were often linked with knowledge, health and power. Bees were considered servants of the Gods and honey was worshipped due to its healing attributes and power. They are represented in jewellery, money, and statues of Goddesses.

One of the most famous legends of the Gods in Greek history is of 'Melissa', the Goddess of the Bees. In the human world, priestesses were referred to as 'Melissae' in the temples of the Goddesses. In Greek mythology, Melissa was a nymph who was shown the use of honey by the bees. She was one of the nymph nurses to Zeus when he was born to Rea in a cave that was sacred to bees. There have been two versions though of the myth. One states that the bees nurtured Zeus, whose son was then nurtured by the 'Melissae'. The other states that it was Zeus who was fed with the milk of goats and with honey by the 'Melissae'.



Melissa, the Bee goddess of Mount Eryx. (British Museum, Wikipedia).



Images of Melissa. (Ransome)



The Ephesus statue Al



The Roman one (Ransome). Artemis, the Ephesian Goddess of the Hunt and Fertility has connections with the honeybees in Ephesian worship. The statue originally had no bees, but a second statue in Roman times depicts two bees on either side the middle the column. Diana was still worshipped in Roman times - in the Acts of the Apostles we can read about the people heckling "Great is Diana, God of the Ephesians" causing great disruptions in Thessaloniki and Corinth.

Honey is often referred to as a gift, the 'nectar of the Gods'. Greek Gods were often described or depicted drinking ambrosia. Historians have suggested that ambrosia was a representation of honey due to its colour and taste. Ambrosia was believed to quench any thirst or hunger for the immortal beings of Mt. Olympus. It did, however, have other purposes such as being used as a balm for Gods to transfer immortality. For example in the myth Achilles was bathed in honey and then passed through the fire so that all his mortal parts would die. However, because he was held by his ankle, this was the only vulnerable part of him. The mystique of ambrosia was reinforced in the myth of Tantalus who is punished for stealing the ambrosia and giving it to humans. Those who drank it would no longer have blood running through their veins but Ichor (the mythical fluid in the veins and arteries of the gods).

In other legends such as those surrounding Zeus, bees were represented as messengers between Gods and men and carriers of wisdom and knowledge. In the story of Apollo and Delphi, the Boeotian (a man from central Greece) who had come to consult Delphi is referred to another oracle but on their journey he and his companions became lost. They followed a swarm of bees that lead them to Trophonios. Here the bees are represented as guides with close links to the Oracle, leading them to find another one. Through this myth bees are associated with prophecy, knowledge and foresight.. a representation that continues to the present day.

Honey also played a very practical role in Greek society and in everyday life. It was a source of food and associated with celebration and good times.

Honey was also widely used for healing wounds and preservation, essential requirements for health and prosperity. It is therefore not surprising that the bee and honey featured prominently on key material artefacts including jewellery, statues, pots and coins. Moreover, as Greek civilisation spread this meant that the bee began to appear in other cultures such as that of Ephesus (Ephesus, Turkey) on items such as coins which are themselves both a physical and symbolic representation of wealth.

The Minoan pendant found in the Minoan Palace of Mallia, Crete. It originates from around c.1800 BC. Bees were believed to connect the natural world to the underworld which might explain why it was put in the tomb with the deceased. The bee was the symbol of Potnia, the Minoan-Mycenaean Goddess.

The Bee in Ancient Egyptian History (3000- 30BC)

Ancient Egyptian society is regarded as the first great civilisation period, lasting nearly 3000 years. As in ancient Greece, bees and honey feature in myths and legends where they formed an important part of everyday life - including honey being used to pay tax.

The bee appeared in writing, sometimes to refer to the bee or bee keeper but also in terms of Royalty. The 'bee' was the name given to the lower half of Egypt as it was full of flowers which the bees would pollinate. The Pharaoh was known as 'he of the sedge and bee' which translates as the King of Upper and Lower Egypt.

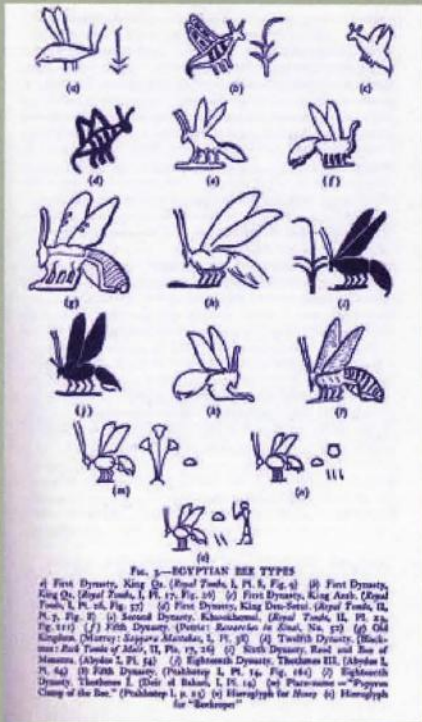
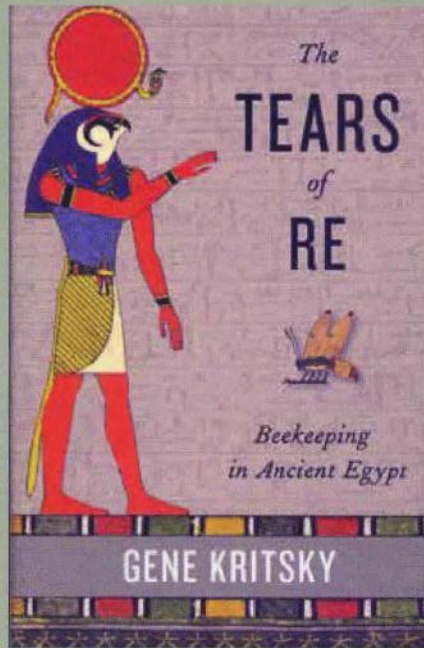


FIG. 3.—EGYPTIAN BEE TYPES
 (a) First Dynasty, King Qa. (Royal Tomb, I, Pl. 8, Fig. 1) (b) First Dynasty, King Qa. (Royal Tomb, I, Pl. 17, Fig. 24) (c) First Dynasty, King Ankh. (Royal Tomb, I, Pl. 26, Fig. 27) (d) First Dynasty, King Djeser. (Royal Tomb, II, Pl. 2, Fig. 2) (e) Second Dynasty, Khasekhem. (Royal Tomb, II, Pl. 11, Fig. 11) (f) Fifth Dynasty, (Dendera: *Revue de l'Égypte*, No. 52) (g) Old Kingdom. (Narrow: *Revue de l'Égypte*, No. 52) (h) Tenth Dynasty, (Blackman: *Real Ties of Egypt*, II, Pl. 17, 24) (i) Sixth Dynasty, Bent and Son of Mennu. (Aubrey: I, Pl. 24) (j) Eighth Dynasty, Thothmes III. (Aubrey: I, Pl. 24) (k) Tenth Dynasty. (Pachepy: I, Pl. 14, Fig. 14) (l) Eleventh Dynasty, (Aubrey: I, Pl. 14, Fig. 14) (m) Hieroglyph for Honey (n) Hieroglyph for "Beekeeper"

Representations of the bee throughout Ancient Egyptian times. (Ransome)

The sun God Ra plays a central role in Ancient Egyptian culture. Ra was described as the father of the Gods and the creator of the pantheon. All Gods should represent an aspect of Ra whilst Ra represents all Gods. Ra was considered to be the creator of the seasons, animals and mankind. The legend is that bees were created from his tears that fell to earth passing on a secret message. The right eye was said to have healing and protective power. Bees were regarded as servants of the Gods, delivering messages and healing

powers from them to mankind. The role of bees as messengers of the Gods is also central to the myth of the lost God Hittite Telepinu. Telepinu was the God of farming who one day due to frustration stormed off into a meadow and fell asleep. His anger upset the world of nature and nothing grew in the fields. Due to this destruction the Gods tried to search for him, but to no avail. Eventually the bee was asked to find him and did so, stinging him to wake him up which only increased his anger. However, the Gods were able to calm him and he returned to tend his fields and bless the rivers.



The Sun God Ra. (Cover of Professor Kritsky's remarkable book on the bee in Egyptian times).

Unlike in the myths of Ancient Greece, the bee also features as a symbol associated with death and the resurrection of the soul and Egyptian culture showed a belief in the afterlife. Pyramids were constructed to provide the Pharaohs with all the things they would need in the afterlife. The mummification process was to preserve all the vital organs so that the body could be resurrected and images, artefacts and symbols of bees are commonly found in tombs and burial chambers.

The bee and honey are manifested in the material artefacts, myths, beliefs and practical everyday lives of both ancient Greek and Egyptian society. As we turn the clock forward, we see that the bee and honey continue to appear with remarkable regularity in different cultural settings. As we shall see, however, their appropriation, symbolism and meaning shifts in line with cultural values and wider historical, social and economic context.



Bees in the Time of the Medicis. The plinth of the Ferdinando I de' Medici (r. 1587-1609), in Florence, is decorated with bees surrounding the queen.



Fontana delle Api in Rome, completed in April 1644, to relinquish the thirst of both people and horses, the father spouting from the mouths of honeybees.

Napoleon (1804 – 1814/15)

The positive qualities associated with the bee and honey continued well beyond ancient society. As an example, the bee became a significant symbol in the Napoleonic period. Following the French Revolution (1789-1799), Napoleon became Emperor of France (1804) replacing the monarch dynasty that had ruled for several hundred years. Royalist assassination attempts threatened Napoleon. He asserted his power and authority by adopting a number of features of the Ancien Regime, including moving into the palace of Versailles. He created a council commission its sole purpose being to 'plan everything to

do with the coronation of the Emperor and Empress. They decided to adopt the bee as his symbol as it represented immortality and resurrection.

The symbol of the bee flooded the courts of Napoleon and became associated with many different qualities including hard work, industriousness, vigilance and, due to its production of honey, sweetness and benevolence.



The Napoleon bees used as part of the cover design of a beautifully leather bound book. (Geoff Hopkinson).

The bee also had historical links with 'Childeric I, founder in 457 of the Merovingian dynasty', who ruled Northern Gaul (modern day France) from 437-481 AD). The tomb of Childeric was discovered in 1653 and found to contain many precious artefacts including 300 winged bees.



The Childeric Bees. (Wikipedia)

Bees and Freemasons

It was not just the freemasons who adopted the hive as a symbol to represent ideals and virtues. Nineteenth-century leaders of The Church of Jesus Christ of Latter-day Saints (more often referred to as Mormonism) consciously created symbols to promote their democratic ideals. The symbol of the bee encompassed all aspects of Mormon life as shown by their use in modern temples,

4. From Pomerania.
Just at the height of the honey flow there was a dreadful storm, so that no bee could leave the hive. For eight days there was storm and rain, and as the sun came out on the ninth day it was Sunday and work was forbidden. But the bee said, "What does Sunday matter to me? I have been obliged to rest eight days, and I am not going to be lazy on Sunday." Then God exhorted her to desist from her intention, but it was no use, the whole day the bee worked with all her might. Then God spoke, "As a punishment for breaking the Sabbath, the flowers which bear the most honey shall be closed to thee for ever." From that time the neck of the red clover became so long and narrow that no bee can suck honey out of it.

So, are bees ever seen to have negative qualities? There are folk tales from many countries that explain why bees are unable to make use of red clover. The one here comes from Pomerania.

caskets and tombstones. The origins of the bee and the beehive are reputedly drawn from the 'Book of Mormon' published in 1830 by the founder, Joseph Smith. It is also said that in the journey to what is now Salt Lake City, they 'did also carry with them deseret which, by interpretation, is the honey bee'.



Masonic Firing Glass.



Bees and political economy

The advent of mass industrialisation from the 1830's onwards saw the bee and the hive being appropriated as symbols of industry

and the virtue of hard and selfless working for the greater good. The bee was adopted by Manchester Council as long ago as 1842, and workers in the city were often referred to as being 'as busy as bees'. The beehive has often featured in the political imagination as an allegory for the working class, drawing parallels with a proletariat 'which lives from the sale of its labour and does not draw profit from any kind of capital.'



The coat of arms of Manchester. The seven bees above the helmet are a tribute to Manchester's long association with industry. (Wikicommons).

Others viewed the hive less favourably, highlighting how the 'hive' symbol removes individuality and showed a work force no longer being celebrated for their unique individual talents. During the cold war, rather than the virtuous association of collectivism, bees began to be used to represent the Russians as evil collectives and symbols of anxiety.

Conclusion

In conclusion, symbols of the bee, hive and honey appear in many different cultures and societies through human history. This short article has covered a small number of examples to show the wide range of symbols, representations and meanings. Whilst the majority reflect positive or virtuous characteristics of bees they can also be interpreted as displays of wealth, power and control. This begs the question not only of what the bee represents but who creates, controls and reproduces the symbols and material artefacts and for what purpose.

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<https://beekeepers.peacockmagazines.com/>

Isabelle Hopkinson



Based on an Extended
A level Project
Qualification submission
by Isabelle Hopkinson,
supplemented by additional
work as a 1st year student
reading Anthropology at
Exeter University.

Late Summer Early Autumn

Tasks To Consider

Kim Flottum

To be sure that information is relevant as to where you live, I try to time things that need to be done in the southern and northern sections of the country because temperatures, honey flows and stresses can be significantly different. Look at the map on this page that roughly divides the US as north and south. Of course, the border areas tend to be somewhat schizophrenic, some years north, some years south. So, if that's where you live, you'll need to pay attention to both areas, because it'll probably be different next year. And above all else, remember that all beekeeping is local

In the South

Late July, early August is the key time for a lot of tasks in the beeyard, and in the bee hive. In the south, harvest is mostly complete because the majority of bloom was over by late June, with perhaps a few crops hanging on for another month or so. Food may be a problem for your bees, more so the further south you are. If you harvested from an overwintered hive, you may have to feed, and the feed you are giving is going to be winter food, to be stored, and, food for right now. Get a Spring scale, one that you can hold in one hand, with a hook on the bottom. Lift the front, lift the back, add the two weights and, for 2, 10 frame deeps, top and bottom, bees, brood and food, the total should be 150 pounds or more. If lighter first choice is honey from one of your healthy hives that has extra. Honey is always the best choice. But if not, feed a 1:1 sugar syrup in August, moving to a 2:1 in September until your weight is enough. And if you're in a dearth, get in and out during your inspections to avoid too much exposure and starting a robbing session. First year hives are especially vulnerable now, so keep checking for food as often as you can and feed until full. And what's the small hive beetle situation? If you're seeing them on frame tops, inner cover and in cells you've got too many, not at all uncommon in the south. Get traps, yesterday. The between-frame V shaped plastic work well. And do your *Varroa* test by yesterday if possible. You should treat if you find more than 1 in a 300-bee wash. And you want none now because the bees that are born from now until October are the bees that overwinter, and you want them healthy, wealthy and wise. Find out what others are using for treatments and follow instructions. Besides food, check for any diseases, and how the queen is doing. There should be several frames,


6 - 10, of all stages of brood now, tapering off in late August and not having much by the end of September. Combine weak colonies if necessary, keeping the best performing queen.

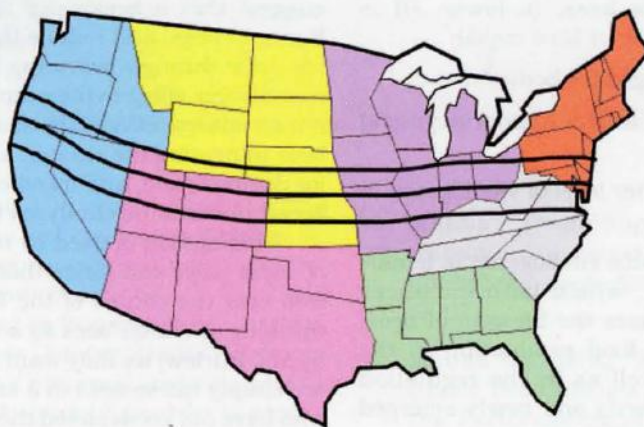
In the North

In the north, there are still honey flows going on now, but check just in case. You may be able to get a short harvest now from overwintered hives, leaving enough for Winter food. If you started as a package, probably no extra honey will be available. Be generous the first season and let them have it all. But, on occasion you may have had a generous Summer flow that you can sneak some of. And consider a 3 for 1 check. You're looking at how much honey is on the hive. If you've already harvested from stronger hives, you'll need to make sure that what's left is going to be enough. A good rule of thumb is to assume the honey flow ends tomorrow and this is all you'll get. If it's not enough, watch into August to see if more comes in, and feed if not. The second thing to check is the queen's performance. Your first-year brood nest should have at least 7 or 8 frames with brood of all stages on both sides. Don't worry if it's close, rejoice if it's more. Older hives should have more. But if not, queen replacement is something to consider, if you can find one.

By September, hives with under-performing queens should be combined with strong, healthy colonies, removing the queen from the smaller colony. Check for all the usual suspects when it comes to diseases, and make sure, make doubly sure to check your *Varroa* population. If more than 1 in a 300-bee sample, you can probably get away with a treatment right now, before the Fall flow from goldenrod. But don't

treat during the goldenrod flow. And, by all means, treat rather than harvest. Treating now means you'll have bees next Spring. Do the Spring scale trick mentioned above and you should be at 150 pounds or more by the end of September. Feeding for Winter food, if needed can start toward the end of that month, continuing until hard Winter sets in.

For both areas, take a look at your beeyard. Weedy? Messy, with unused equipment or weeds all over, blocking entrances? Start getting it spiffed up now, so when the Winter work begins in October you have nothing in your way. 



WINTER BEES:

Staying Youthful with Fat Bodies

DD Burlin

There appears to be some debate about the key to longevity in the Winter bee, and studies of differences in bee lifespans have even been conducted and reported in gerontology journals as scientists seek to understand the human aging process. One trusted on-line source (Rusty Burlin at Honey Bee Suite) described Winter bees as another caste (in her January 2017 blog post), but the scientific journals do not entirely support this notion. So, what are Winter bees? (Let's leave the human search for the fountain of youth to the gerontologists).

Winter bees can live 100 days on average, as compared to Spring workers who live on average 30-40 days, and Summer bees who live on average a significantly shorter 25-30 days. Within a colony, all of these workers are female, and all are sisters, bred from the same queen, yet their different lifespans vary greatly. With little to no brood production during the Winter, and in order for the hive to survive months of cold temperatures in northern climates, the development of healthy Winter bees with their longer lifespans is critical.

The physiological differences between Winter and Spring and Summer bees include the following:

- The level of Juvenile Hormone is lower in Winter bees than in Summer bees, (a lower JH is generally associated with in-hive tasks);
- Winter bees have enlarged fat bodies;
- Winter bees have enlarged hypopharyngeal glands; and
- Winter bees have a higher level of vitellogenin in their hemolymph.

The fat bodies in bees produce vitellogenin (a female egg-layer specific lipoprotein), which both enhances the immune system and increases the lifespan of bees. Vitellogenin is used in brood food production in the production of royal jelly, as well as in the regulation of foraging behavior. Both queens and newly emerged workers have high levels of vitellogenin at emergence, and while the level drops as worker bees age, it remains high in the long-lived queen. As the level of vitellogenin drops for worker bees a chain reaction occurs in which the level of Juvenile Hormone begins to rise, and the hive bees evolve into foragers.

The gradual replacement of Summer bees by Winter bees has been shown to correlate less to environmental conditions (e.g. temperature, and day-length) and more to conditions within the hive. Winter bees develop while the hive is in a broodless state during the late Summer and early Fall months. But their development must not be solely during broodless states or we would see them develop in hives that are not queen-right, and during



dearths when some queens will stop laying.

One can see the effect of the cycle of the seasons: when there is little pollen coming in, foraging decreases (and its related forager pheromone increases as the foragers are all in the hive, and not out foraging), brood rearing decreases as do its attendant pheromones, and Winter bees are produced with their high level of vitellogenin. In the Spring the reverse occurs, and brood development triggers a reduction in vitellogenin due to brood pheromone, which in turn increases the level of Juvenile Hormone which then stimulates pollen foraging.

Specific experiments on the influence of pollen in the development of Winter bees suggest 1) that a reduction in pollen resources triggered the onset of Winter bee production, and that conversely, supplying additional pollen delayed the development of Winter bees (and though there was no impact on the number of Winter bees produced, the additional pollen would result in a somewhat shorter lifespan of the Winter bees), and 2) whether hives were supplemented with pollen, deprived of pollen, or kept as a control, there was no difference in the performance of the Winter bees, and they all had similar physiology and brood-rearing efficiencies. These studies suggest that a beekeeper could prolong the season of Summer bees, and reduce the duration of the Winter bee life-cycle through providing late Summer pollen with no real adverse effect to the number of Winter bees produced, nor an adverse effect in their actual performance as Winter bees in heating the cluster, surviving until Spring, caring for Spring brood, and transforming into foragers once the brood pheromone catalyzes that transformation.

Vitellogenin is used by nurse bees in the production of royal jelly, and since there is no significant brood to feed over the course of the Winter, perhaps rather than thinking of Winter bees as a separate caste (as suggested by Ms. Burlin) we may want to consider that Winter bees are simply nurse bees in a state of suspended animation who have not yet depleted their vitellogenin stores. (Again, we'll let the experts in gerontology determine whether there is a human parallel in which a woman caring for her children becomes haggard and ages that much quicker than a woman without such duties... I volunteer to participate in the haggard control group of such a study).

While the presence of brood pheromone on its own (with or without the presence of actual brood) has been shown to reduce the level of vitellogenin and the long-term lifespan of a honey bee, all Winter bees die at around the same time, regardless of their emergence date, suggesting an elevation in Juvenile Hormone at roughly the same time among these bees as they begin brood rearing. Furthermore, there is still some uncertainty as to whether Winter bees differentiate themselves from

Summer workers during the larval state or at the time of emergence. Döke, et al. describe the increase in Juvenile Hormone in the Spring as correlating with the decrease in vitellogenin and hemolymph protein levels, and suggest that it is as if the Winter bees return to a forager state in the Spring. So, it appears that Winter bees simply remain in a less mature state while the colony is in a broodless state during the Winter months, and then progress along the typical maturation timeline as brood rearing begins in earnest.

So, what does this mean for a beekeeper in a northern climate trying to keep his/her bees alive until Spring?

When we read that *Varroa destructor* mite negatively impacts vitellogenin titers, reduces abdominal proteins and carbohydrate levels, and reduces lifespans, and take that information in the context of Dr. Samuel Ramsey's findings that *Varroa* feed on fat bodies rather than on hemolymph, we can begin to understand how imperative it is to control mite populations before Winter bees are developed.

A 2001 study conducted by Heather Mantilla in Manitoba, Canada described the gradual replacement of Summer bees with Winter bees in a control hive as beginning on August 31 (suggesting the eggs were laid on August 10), and brood rearing concluding on October 30 (so last egg laid on October 9), whereas hives that were requeened on July 26 did not have Winter bees emerge until September 12 (eggs laid August 22) and brood rearing ending altogether between November 11-23 (laid between October 21 and November 2). Randy Oliver (located in California) suggests getting mite levels in control before August 15, in order to ensure the health of the Winter bee population.

Is there a way to buy yourself more time if the mite load within a hive is high, or you just haven't quite gotten your beekeeping work done before mid-August? Could raising Winter bees a little later in the season provide a shorter window during which you need to keep those Winter bees alive?

From the research cited above, I propose two possibilities: 1) feeding a pollen supplement in the late Summer could encourage a somewhat longer brood-rearing season which would in turn delay the production of Winter bees without negative impact; and 2) because younger queens tend to lay later into the Fall, and the

continued existence of brood pheromone delays the development of Winter bees, re-queening a hive with a queen bred during that Summer may shorten the lifespan requirements of the Winter bees.

Am I grasping at straws in my attempt to over-winter my hives? Maybe, but I do treat for mites, and I have seen colony dead-outs in Winter that surprised and dispirited me. I'm ready to try anything.



- i. Winkler, et al., "Transcriptional Control of Honey Bee (*A. mellifera*) Major Royal Jelly Proteins by 20-Hydroxyecdysone," *Insecta* (2108).
- ii. Sedal, Brynem, et al., "Brood Pheromone Suppresses Physiology of Extreme Longevity in Honey Bees," *Journal of Experimental Biology* (2009).
- iii. Matilla, Harris & Otis, "Timing of Production of Winter Bees in honeybee (*A. mellifera*) colonies," *Insectes Sociaux* (2001).
- iv. Döke, Frazier, and Grozinger, "Overwintering honey bees: biology and management," *Current Opinion in Insect Science* (2015).
- v. Matilla, "Dwindling pollen resources trigger the transition to broodless populations of long-lived honeybees each Autumn," *Ecological Entomology* (2007).
- vi. Matilla and Otis, "Manipulating Pollen Supply in Honey bee Colonies during the Fall does not affect the Performance of Winter Bees," *The Canadian Entomologist* (Aug. 2007).
- vii. (Smedal, 2009).
- viii. Matilla, (2001).
- ix. Döke (2015).
- x. Ramsey, et al, "Varroa Destructor Feeds Primarily on honeybee Fat Body Tissue and not Hemolymph," *PNAS* (2019)
- xi. Matilla, (2001)

THE NEXT STEP BOTTLING



David MacFawn

Bottling equipment is an important step in extracting honey and processing it for sale or personal use. Plastic 60-pound/5-gallon honey buckets with a plastic knife gate (see picture below) work well for fewer than five to ten bee colonies. However, the knife gate tends to drip when closed due to honey getting on the knife part of the gate. You need 10 to 15 or more colonies to justify the approximate \$225 to \$300 cost of a stainless-steel honey-bottling tank. A honey-bottling valve allows filling jars without honey dripping. Dispensing honey quickly enough ensures that it does not crystallize in the tank therefore a heated tank is not required.



Figure 1. Plastic 60-pound/5-gallon honey bucket with a plastic knife gate. Tight-fitting lids should be used for all honey storage buckets. (Photo courtesy: Dadant.)

The 70-liter Lyson tank has a clamped, gasketed lid and handles. The clamped lid is important to make sure insects and dirt do not get into the inside honey. The handles make lifting and carrying the tank much easier. The tank needs to be lifted on to a counter or carried someplace to clean. The 70-liter (18 gallons) Lyson stainless-steel tank will hold about 216 pounds of honey. That is about seven hives producing 30 pounds of honey



Figure 2. The 70-liter (18 gallons) Lyson stainless-steel tank. (Photo courtesy: Betterbee.)



Figure 3. Conical bottom of the Lyson stainless-steel tank. (Photo courtesy: Betterbee.)

each with one medium eight-frame super. The conical bottom with welded stainless-steel pipe (from tank center) allows all the honey to drain out of the tank without tipping the tank (necessary with a plastic 60-pound/5-gallon honey bucket with a plastic knife gate).

The Maxant No-Drip Bottling Valve works well and lives up to its name. It is made of stainless steel and should last several years. The height of the Maxant bottling valve on the Lyson tank requires the tank to be raised in order to place a jar under the valve.



Figure 4. Maxant No-Drip Bottling Valve. (Photo courtesy: Betterbee.)

When the honey frames are extracted cell caps are cut off with a knife before placing the frames in an extractor. A heated knife or a non-heated serrated knife can be used. Often the cell caps may be sunken below the edge of the top bar or sides of the frame. A capping scratcher is required to remove the cell caps in this case. When a capping scratcher is used, granules are introduced in the honey that are difficult to filter out. These granules may cause granulation of the honey. The granules also collect on the bottling tank insides. By letting

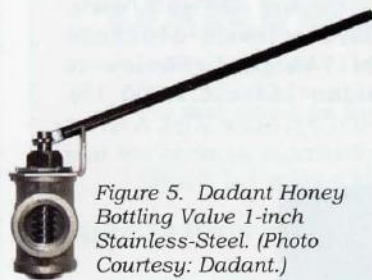


Figure 5. Dadant Honey Bottling Valve 1-inch Stainless-Steel. (Photo Courtesy: Dadant.)

the honey settle, the granules typically sink to the bottom of the tank, or to the top of the honey with foam that is introduced by bubbles getting into the honey during extraction. After extracting the honey, it should settle for at least two weeks in the five-gallon buckets at temperatures in the 80° F. or warmer before bottling.

Do not use frame spacers before the comb is drawn out of the frames. This can result in extra comb between the frames. Nine-frame spacers are used in ten-frame super and seven-frame spacers are used in an eight-frame super after the comb is drawn out in the frames. The spacers result in the bees drawing the comb out past the top bar, allowing easy removal of the caps during the honey extraction.

Heating the honey in a tank may be required if the honey granulates. Different kinds of honey granulate at a different rate due to the glucose content. Honey contains mainly glucose and fructose sugar with some sucrose sugar. A higher glucose content than fructose causes quicker granulation. A higher fructose content compared to the glucose content will result in the honey remaining liquid for longer periods. The honey may be re-liquified by heating it to no more than about 95°F. (35°C.). Above 100°F. (38°C.), the flavor of honey is altered. Above 120°F. (49°C.) the beneficial enzymes in the honey start to break down. In the southeast, cotton and holly honey will crystallize much faster than Tupelo honey. A water-jacket-heated tank works well to ensure the honey does not crystallize if not dispensed over a long time. A tank blanket heater (see figure 10) is also available to heat your honey.

Figure 11 shows a Maxant heated water jacket tank with an old design honey-bottling valve. Note this Maxant bottler requires the tank to be tipped to get out all the honey. This is not an issue if the tank is kept full. It requires the tank to be on a stand to get the jar under the bottling valve. It is worth investing in good-quality equipment if you are going to keep bees and produce honey.

Use jars that support your sales and marketing plan. In the southeast, pint and quart jars are often used to sell at a farmers' market. If selling into an upscale market different jars should be used. Consider using squeeze bears and one-pound queen-line jars as well.

Apply labels to your jars. A label conforming to your state's labeling laws and the Fair Packaging and Labeling Act should be used. Typically, this means NET WT. must be in both ounces (oz) and grams (g) and must be the proper font size (https://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=d46d8c24934536de0ef58344303bf174&rgn=div5&view=text&node=16:1.0.1.5.62&idno=16#se16.1.500_15). The address must be added (City, State, Zip). A street address is required if the business name is not in a



Figure 6. Heated uncapping knife. (Photo courtesy: Dadant.)



Figure 7. Serrated non-heated uncapping knife. (Photo courtesy: Dadant.)



Figure 8. Capping's scratcher. (Photo courtesy: Dadant.)



Figure 9. Nine-frame spacers in a ten-frame super. (Photo courtesy: David MacFawn.)



Figure 10. A honey storage tank blanket heater. (Photo courtesy: Dadant.)



Figure 11. Maxant Water Jacket-heated honey tank. (Photo courtesy: David MacFawn.)

local phone book. Honey sold to the public must be labeled properly. Also, recommended is a honey granulation label, and a label indicating that honey should not be fed to infants under one year old. The label style should support your marketing plan.

Plastic 60-pound/5-gallon honey buckets with a plastic knife gate work well for a small number of colonies. More

colonies are required to justify the cost of a stainless-steel bottling tank. A conical bottom with welded stainless-steel pipe (from tank center) allows all the honey to drain out of the tank without tipping the tank that is necessary with a with a plastic 60-pound/5-gallon honey bucket with a plastic knife gate. A heated knife or serrated knife can be used to cut the caps off the cells. A heated knife alters the taste of the honey slightly and ruins a small amount of the beneficial enzymes due to heating above 120 °F. Frame spacers should only be used after the comb is drawn out in the frame. Proper jar labeling is also very important.

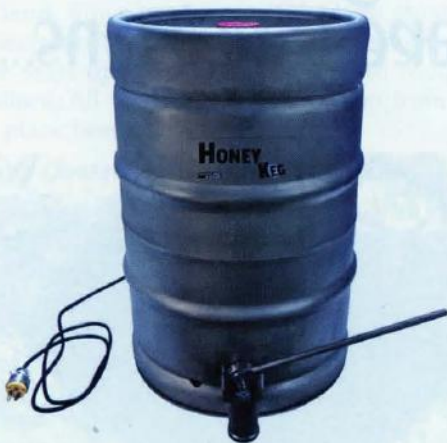


Figure 12. Mann Lake Honey Keg heated honey bottling tank (Photo courtesy: Mann Lake.)



Figure 13. Top of Mann Lake Honey Keg heated honey bottling tank. (Photo courtesy: Mann Lake.)



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

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Why Keep On Keeping Bees?

— HERE ARE 17 REASONS...

Ross Conrad

I am not going to sugar coat it, beekeeping can be challenging. All too often colonies die out. They lose their queen, collapse over winter, starve, or worse. One's true beekeeping metal is tested when all the hives are dead. Do you throw in the towel and quit, or order more bees and try to do better next time? The saying is trite but true, "winners never quit and quitters never win." So for those of you who may be facing this decision now or in the future, here are some reasons why it is worth your effort to persevere and not give up on the bees.

An Ancient Craft

The human/honey bee relationship is seven to eight thousand years old according to cave painting remains. Meanwhile, organized beekeeping's deep roots date back to at least the time of the ancient Egyptian civilization, allowing you to be a link in the chain that carries on this honorable activity that has a prehistoric lineage.

A Lifetime Learning Opportunity

There is a tendency for beekeepers early in their beekeeping experience to think they know way more than they really do. As the years progress, the realization comes that none of us know as much as we would like to think we do. Not only is our understanding of honey bee biology, management, pests and pathogens constantly evolving, but the world is changing dramatically and the bees are changing along with it. If you have reached a plateau in your beekeeping knowledge, it is because you have stopped learning, not because there isn't more to learn.

Excitement

Beekeeping is exciting! Whether it is the anticipation of getting your first hive of bees, catching a wild swarm, or seeing the queen for the first time, the thrill of keeping bees will not only liven up your life, but will provide you with countless stories to tell.

Fun For The Whole Family

Beekeeping is a wholesome activity the entire family can enjoy. Most children (and adults) are fascinated by the inner workings of the bee hive. For the more cautious members of the household, there are plenty of bee related activities that don't involve a high risk of getting stung: Harvesting and bottling honey, building, preparing and repairing bee equipment, rendering beeswax, making beeswax candles and salves, the list goes on...

Be A Producer Rather Than A Consumer

As a beekeeper you are adding to the abundance of life by creating an environment where more honey, beeswax, pollen, propolis, royal jelly and pollination can all take place. We are rewarded in numerous ways when the work we do provides for ourselves and others.

Beekeeping Is A Necessary Activity

We all like to eat and bees have become an essential part of our industrialized food system. Keeping bees helps sustain our civilization in a very direct way.

Retain Your Freedom

Unlike dogs, cats and farm animals, bees do not need daily attention. A visit and inspection about once every week to ten days during the active season is all that is required. Inspections during the inactive season (i.e. Winter) are even less frequent.

Be A Local Hero

Public recognition of the importance of honey bees and beekeeping is at an all-time high. The



advent of Colony Collapse Disorder has thrust beekeepers from the comfortable shadows of mainstream society into the bright, hot spotlight as heroes of the environment and pollinator protection.

Build Relationships

Beekeeping is often seen as beneficial to the entire community and this helps to break down barriers between you and your neighbors. When you are a beekeeper you share a passion that connects you to other beekeepers no matter where you go in the world. Even at a meeting of your local beekeeping club you will connect with people of very different socioeconomic, political, religious and ethnic backgrounds all thanks to the honey bees. More often than not, these people will become resources to help you be successful in your beekeeping adventures and expand your circle of friends and acquaintances.

An Activity With Business Potential

More than just a "hobby" beekeeping is often considered an important occupation and part of rural life. Sure there is a level of financial risk, but you can be your own boss, choose your own hours, make all the executive decisions and profit from all the rewards. Best of all, a beekeeping business can evolve

from a backyard and grow slowly without the need for a huge upfront financial investment.

Least Expensive Of All Agricultural Pursuits

The biggest expense in agriculture is typically the cost of land. Since bee hives can be kept most anywhere, one does not need to own land to be a beekeeper. This reduces the start up costs of beekeeping to roughly \$500-\$800 dollars. All you need is permission from the landowner to place bees on their property.

Take Control Of Your Health

Help retake control of your health by keeping bees. Through the production of honey, pollen, propolis, royal jelly and honey bee venom, you have access to products of the hive that have numerous applications for healing and health. Not only that but moving bee equipment around and lifting heavy boxes of honey builds up your muscles. Rather than spend money and time at the gym or under a sun lamp, keeping bees keeps you active while you get fresh air and sunshine.

Learn To Face Your Fears

There's no getting around it, placing yourself in the center of tens of thousands of stinging insects can be very intimidating. Beekeeping allows us to face our fears and gives us the chance to practice staying calm and relaxed every time we visit the bee yard.

Get Closer To Nature

People are healthiest when they have close and regular contact with the natural world. The honey bee can

be our window into this world that is proven to reduce stress, fascinate and teach all at the same time.

Pollinators Are In Decline

Mounting research indicates that it is not just the honey bee that has been experiencing a dramatic increase in difficulties in recent decades. Most wild and solitary pollinators appear to be in serious decline. This is a concern since the majority of plant species on our planet have evolved to require pollination by an animal or insect. Given the amount of stress the earth's environment is experiencing at this moment in history, you can help take some of the load off by creating pollinator habitat and caring for pollinators such as honey bees.

Reduce Your Environmental Footprint

Honey is the only sweetener we use regularly that does not need a lot of special processing after harvesting and can be consumed directly as it's found in nature. Since there is no tilling, planting, cultivating, or fertilizing local honey has one of the lowest carbon footprints of any food you can buy.

Work For Something Bigger Than Yourself

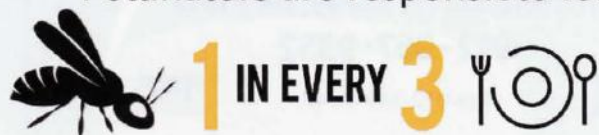
The honey bee's impact on the natural world is profound. Through the act of pollination bees help maintain the abundance of plants, fruits, nuts, berries and vegetables that so many have come to depend on for survival. Through your support and encouragement the work of these amazing pollinators allows you to indirectly help support all of life on the planet.



HONEY BEES POLLINATE TRADE OPPORTUNITIES

Andrea Durkin

Pollinators are responsible for



bites of food we take, supporting billions in agricultural exports.



Harvesting season in the Central Valley

Stretched across some 500 miles throughout California's Central Valley, almond hulls are splitting open, signaling the beginning of harvesting season.

The U.S. Department of Agriculture is forecasting that California's almond growers are set to produce a bumper crop this year of about 2.5 billion pounds, about 70 percent of which will be exported around the world.

It's an industry that drives about one-quarter of California's farm exports and generates about [\\$21.5 billion](#) in economic output for the region including growing, processing and manufacturing activities.

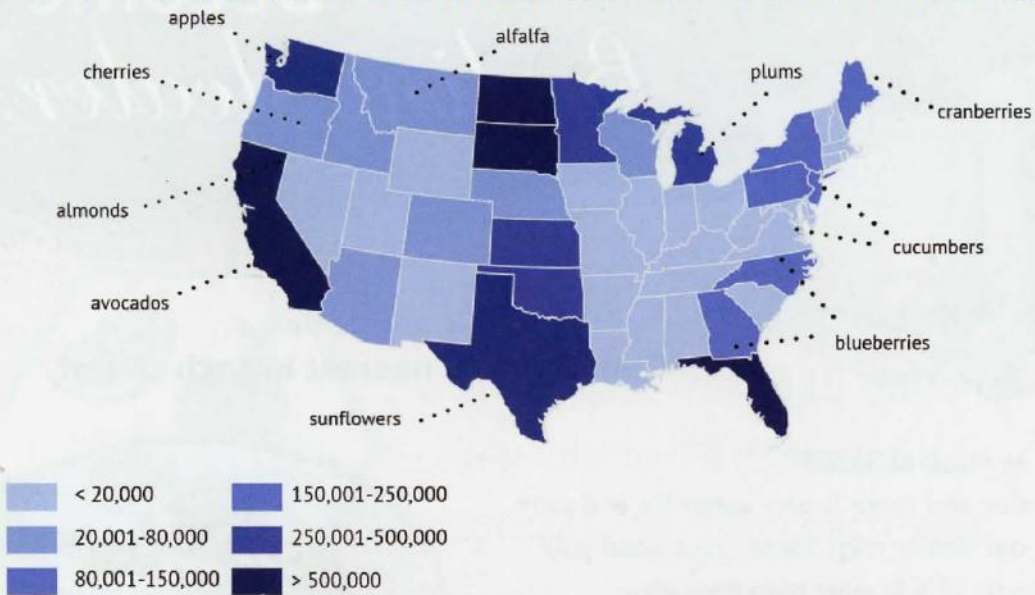
A productive crop must be nourished

California is blessed with the perfect climate for almond production, but it must import one of its most important ingredients: pollinators for the almond blooms.

Every February, two out of every three commercial bee hives in the United States are transported to California, their bee residents pressed into service of the almond bloom.

In fact, it's just the start of an annual food pollinating bee tour. Anywhere from 60 to 75 percent of the bee population kept as livestock crisscross the United States foraging on the blooms of crops that will eventually make their way into our grocery stores and into overseas markets.

POLLINATED CROP ACRES BY U.S. STATE



Source: US Department of Agriculture Economic Research Service, Fruit and Tree Nut Outlook, U.S. Pollination Services-Market, September 26, 2014

First stop, almond orchards

For most commercial bees, the pollinating season begins with almonds, California's largest crop. To provide a sense of scale, Scientific American *estimates* it takes some two million hives – more than 31 billion honeybees – to pollinate the Central Valley's 90 million almond trees during their two-week bloom. It's a symbiotic relationship: the bees gather nectar and pollen to feed their colonies, enabling them to triple their population.

Once almonds bloom in January, hives are moved to other spring-blooming orchards such as cherries and plums in California or apples in the Pacific Northwest. Some head to Texas to pollinate squashes, other to citrus fruit orchards in Florida, and others are dispatched to pollinate cranberries in Wisconsin and cherries in Michigan.

In all, these busy bee travelers pollinate over 90 different crops and then sweeten the deal by shifting into delicious honey production by the end of summer, which they will nourish themselves on over winter while we get to consume the rest. Americans consume a staggering 1.6 pounds of honey per person every year. Even though U.S. beekeepers produced 148 million pounds of honey in 2017 and exported 9.9 million pounds, we imported 447.5 million pounds to keep up with demand from consumers and food producers.



Millions of bees are "exported" state to state to pollinate 90 different American crops.

One in every three bites of food

From cucumbers and citrus fruits to watermelon, kiwis, berries, cherries, apples, melons, peaches, figs, tomatoes, pumpkins and almonds, one-third of the U.S. food supply relies on pollination by the hard-working honey bee.

And, of course, since the United States is a major exporter of agricultural crops, we could say that honey bees help pollinate our trade opportunities. That's true globally for hundreds of billions worth of crop production and internationally traded food that depends on pollinators.



Honey bee pollination alone adds more than **\$15 billion** in value to **90 different** U.S. agricultural crops each year.

Healthy bees, healthy trade in food

When bees get sick, the health of the U.S. agriculture economy and agricultural exports is imperiled.

Although honey bees are not the only pollinators supporting U.S. agriculture, they are the most important, adding more than **\$15 billion** in value to U.S. agricultural crops each year according to the U.S. Pollinator Health Task Force.

Colony collapse disorder over the last few years drew widespread attention, but the decline in North American honey bees is a long-term trend. In 1947, there were about six million colonies but today we are down to about 2.5 million.

Sharp declines were seen following the introduction in 1987 of an external parasitic mite, aptly named *Varroa destructor*, that feeds on the blood of honey bees. Loss rates over the winter have been averaging around 31 percent since 2006, far exceeding the 15-17 percent that commercial bee keepers say is economically sustainable.

The rise of monoculture agriculture with increased reliance on pesticides and reduced use of cover crops is thought to add stress on bee health. The bees are struggling to maintain a varied and high-quality diet - they need protein from pollen and carbohydrates from the nectar of flowering plants. Without adequate nutrition, they are also more vulnerable to viruses.

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Earning The Title Of "Beekeeper"

Are You Sure You Want To?

Becky Johnson

There is something to say about a profession where there is no definitive right or wrong. Whether only keeping a few hives or planning to go big with hundreds or thousands- Beekeeping is certainly not for the weak. For many, the first two years is a true test of personal perseverance; As it is filled with confusion, new terms, people and items that you may never before have encountered. It does get easier for those that overcome the obstacles, challenges and new language over time. So how can you earn the title of Beekeeper, and successfully have honey to share at next Summer's end?

The new language you're about to learn may be one of your larger handicaps, but only briefly. In the beginning, you will have abounding questions and may find yourself searching the internet, Facebook groups or YouTube. Being wary of the advice given on-line is strongly advised. Each state has at least one Beekeepers Association, with a myriad of information usually trickled down to local clubs. Finding yours and learning from local beekeepers is essential, as your area's opportunities and hardships may be extremely diverse from one location to the next. Having a mentor is also fundamental-whether by phone or preferably in person they are able to help you navigate your options and make informed decisions about snags you encounter. Phones will auto-correct almost anything you type, and many of your friends and family will not understand your fascination nor conversation about your new hobby. Finding a great person to learn from is as easy as asking a new friend at a local club for their number. One of the largest assets of knowing other beekeepers is their willingness to talk about honey bees and give advice.

The time investment required depends on the quantity of hives you intend on maintaining and the goals that you wish to accomplish within the year. "More than a cat, less than a dog"-this a good adage for

the amount of time needed for just a few hives. I keep mentioning the first two years, for good reason. This is where you will begin to mold your personal technique in stewarding your colonies, therefore deciding the time you will need per hive for upcoming seasons. During the Spring, expect to find yourself overwhelmed with opportunities in each and every direction of beekeeping. Spend your time focusing on your objectives, the preceding Winter is the supreme time to calibrate your intentions to goals



and motivations. When something doesn't seem to work, there is always another season to try again.

Honey bees come in several "varieties". Italian is a popular option in America, as they are great honey producers and known to be more docile than others. "Stock" is another term used to describe the breed of the honey bee family, also known as a colony. Each breed has individual attributes that help it stand out from others, but the genetics are a minute approach to getting started. No matter which stock suits or is available to you, there are 3 castes in every colony. Drones are the only males, who are incapable of stinging and large bodies and eyes are only useful for one thing- inseminating queens they are not related to. They

cannot gather resources and must beg for food from the second caste-Workers. Up to 90% of the bees within a colony are female and known as workers. From the second they emerge, they work until the day they die. From building wax from special glands on their bodies, helping raise the brood (babies) to protecting their home and gathering all the resources needed by the entire colony. The final caste is a single queen, the mother of all honey bees within her hive. She is responsible for laying around 2,000 eggs every day and secreting pheromones to exchange information on her well-being. The entire colony exists wherever there is room for them to raise their brood, gather resources to overwinter and have safety from predators. This could be a tree, a human's house or a man-made series of boxes.

There are hundreds of options in which style hive to choose from. Many beekeepers refer to the boxes and frames as woodenware. For the time being, I will focus on traditional Langstroth boxes which are commonplace and come in 3 sizes. The largest is called a deep which will be 19 $\frac{7}{8}$ " in length, 16 $\frac{1}{4}$ " wide and 9 $\frac{5}{8}$ " in height, and will weigh upwards of 100 pounds when full. A medium will be 3" shorter at 6 $\frac{5}{8}$ ", which will weigh about 60 pounds when full. The smallest is called a shallow, and will be slightly less than the medium at 5 $\frac{5}{8}$ " deep, weighing in at about 40 pounds when full. Most hives require at least about 20" depth for the bees alone, we will discuss honey boxes later. The biggest decision here is made easy when you think rationally- The bigger the box means the more room and less often it needs to be moved around; but keep in mind that also means the weight will be heavier when you do have to lift them. Many beekeepers find it easiest to stick to one size- Mediums, so all their equipment is interchangeable. No matter the size you choose, inside each box are frames- bars that you lift out of the box to check the bees.

Foundation is the wall within each frame that bees create their wax comb on. Frames and foundation come in several styles from plastic to natural wax, and about a dozen others in between. Focus on the foundation first, which will decide which frame is required to hold it upright. Keep in mind that these are just boxes to house your bees.

Beekeeping supplies may seem hard to come by as you get started, but you will soon realize the myriad of options available. Some beekeepers are very handy and make their own equipment, as there are plans on many websites for all different styles. If you would rather purchase, asking local beekeepers may teach you there is an equipment store nearby. If not, there are dozens of reputable suppliers that ship. Be suspicious of any company that does not have their own website with reviews from other beekeepers. Although the dimensions of hives are mostly standardized, it is advisable to stay with one manufacturer as there may be slight differences despite similarities. A great notion is to purchase a bee magazine and after reading the articles, look at the advertisements. In most areas, buying or selling used equipment may be against the law. There is a good reason for this to be in place. Honey bees can carry a slew of underlying issues if not managed correctly, some of which can be transferred or affect the woodenware. Always have more equipment than you think you will need. Each year is different, and the bees will teach a very valuable lesson of being prepared if you do not think ahead.

There is a fashion to beekeeping as well. The all white T shirts, jackets or entire suits have their place below a screened veil in the attempt to ward off stings. Some beekeepers are more comfortable in less, while others may require a bit more protection due to allergy or confidence. Don't let confidence from a sweet Spring colony fool you as a sting to the eye has the ability to make you blind, a veil is strongly advised. Make sure whatever you wear is a good fit and is not snug against your skin. Try to avoid dark colors and strong smells, such as: cologne, perfume, body odors, etc. Prepare to check your gear often for rips or holes that may allow a determined bee entrance.

When you get stung or your gear needs to be washed, do so. The easiest way is to remove the veil and wash on gentle- but check tags to make sure you're cleaning according to the manufacturer's instructions and hang to dry. When a bee gets into your gear, don't panic. There may be one or two on the inside, but thousands outside. Walk away as calmly as possible to a safe area away from all hives and remove your gear slowly. Remember, if you feel something running down your body it is probably sweat; if it is running up your body, it is probably a bee.

Once you have your hives, where do you put them? Location is very important for the beekeeper as well as their new colonies. Southeast facing hives provide early sunlight, with a nearby water source is essential. You want to make your hives easy to access by vehicle or foot, and keep in mind that they will be heavy if ever needed to be moved. Boxes laden with honey are not for the faint of heart for long distances. Honey bees are masters of temperature control. Using their wings and orchestrated placements, they are able to continually keep the temperature within the hive stable despite outside weather. Honey bees can survive in arctic weather as well as smoldering Summer heat, yet moisture can sign a death warrant on a colony. Keeping them ventilated is imperative throughout the year; especially in Winter when the cool outside air meets the bees warm cluster and can create condensation that rains down on them from the inner cover.

Honey bees have pests just like other livestock or pets. Depending on your area, you may encounter more than others. It is imperative to monitor such intrusions on your colonies. Varroa mites have a long-standing track record of not only infecting numerous viruses into honey bees, but sucking their fat which defers heat consistency in the Winter. There are several options in IPM (Integrated Pest Management), from sticky boards to chemicals. Some treatments may treat more than one type of mite, or for other pests. It is best to do your research and test your colonies before making any decision on your next steps. The best time to test is another decision you will face. Some beekeepers

may advise that they treat twice a year or more without testing prior. This is a dangerous move, as many chemicals cannot withstand certain temps without irrevocable damage or stress to the colony. There are organic methods as well as more natural approaches, however, it is critical to test for effectiveness after your IPM has run its course to ensure its effectiveness.

After your initial Winter of worry and panic has been washed away by Spring blossoms and bees bustling out of their boxes, add supers and increase your inspections. Honey supers can be stacked on top of your brood chamber, or lower boxes, several or one at a time. Determine that your colony has plenty of room for the plethora of new resources at least weekly if needed. As Spring continues, consider making a plan regarding your upcoming honey harvest. Take time to strategize your sales, choosing bottles and labels that help your product stand out. Start taking pre-orders from those that have seen pictures or made comments about buying your honey. Once summer starts to ascend, your bottles may be on backorder or not be received in time for your harvest, so order early. Ask a fellow beekeeper to borrow their harvesting equipment only if you know the health of their bees. Once you have harvested honey from your colonies, it is hard to ever put your hive tool down.

The only way you truly fail at beekeeping is to refuse to learn and adapt. Continued education will create a solid foundation for your understanding and milestones in beekeeping. Attend conferences, club meetings and social gatherings every chance you get. There is an excess of information available with social media and on line resources; The best beekeepers acknowledge even after decades of honing their craft hands on that there is still much to learn. Many beekeepers will tell you they have picked up most of what they have learned from fellowship over lectures. Reading is fundamental, and your ever-growing desire to learn more is only beseeched by the multitude of options. Focus your attention on adapting your strategies based on your personal ideas and goals, but be willing to change your methods and try things that have

been vetted reliably by scientific data through trials. Read the multitude of research that has been done and know that there is still much to learn. Trying new methods may flop, but considering them experiments takes the sting out of the failures. Learn from your mistakes and listen to your bees, the ultimate mentors in their stewardship.

Beekeeping in general is a very personal hobby. For most, being in your bee yard is a solo experience. Remember all the lessons learned, books and articles read, and tips and tricks from those you've met and you are never truly alone. Each time the lid is cracked and the smell of the hive hits the air, new ideas and questions will entrench you. Each avenue throughout beekeeping is wrought with decisions that are truly intimate between you and your colonies. You will change your mind millions of times regarding your processes and previous thoughts. You will hear conflicting information from those you revere, as well as being the new bee expert among those that do not keep bees. You will track things such as pollen reports, roadside wildflowers and the weather like never before. No matter how you got started in beekeeping- once your honey bees arrive, you are now the steward of thousands of stinging insects you willingly will end up paying a small fortune for, and it will be worth every penny.



Fall Italian Queen



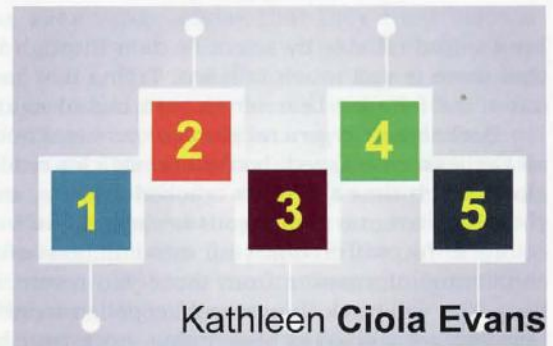
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5 Easy Steps To Split My Colony



Splitting, or dividing colonies is a common practice for beekeepers to help prevent swarming, and is an excellent tool to increase colony numbers and compensate for previous Winter losses. Swarming is a normal sign of a productive and strong colony, but it can pose a problem



The queen and about 60% of workers leave en masse and cluster on a nearby object, such as a tree, before finding a suitable nest. (b) A colony occupying an abandoned shed near Harrison Valley, PA (photos by Katy Evans)



for many beekeepers and severely depress honey crops due to loss of bees. Swarming is when the queen, along with the majority of worker

bees, leave to establish a new nest, for example in a neighboring tree or shed. Despite the many tools available to prevent swarming - including creating additional space with supers and removing queen cells - the most reliable tool is to split a colony before it swarms. Peak swarming season coincides with peak floral bloom during Spring, as lengthening days and ample floral resources stimulate brood rearing, which can lead to overcrowding inside the colony. Early Spring is the best time to perform splits, which in temperate regions typically occurs in April or May. It is not uncommon to split during Summer to prevent a small secondary peak in swarming coinciding with the onset of Fall blossoming.

Splitting a colony can be a daunting task, particularly for beginners. Here are step-by-step instructions for a simple technique to split a colony, without needing to move or shake frames of worker bees. This technique involves five steps:

1. Deciding when to split,
2. Equipment prep,
3. Finding the queen,
4. Splitting the colony's resources (pollen and honey), and
5. Switching locations. I have also included a sketch that illustrates this splitting protocol.

Step 1 - The biggest challenge of splitting a colony is knowing exactly when to split. Colonies begin swarming preparations weeks in advance and if you know what visual cues to look for, you will know when to split. These include colony congestion, presence of queen cells,



Four visual cues that indicate it is time to split include (a) colony contestation (photo by Katy Evans), (b) presence of queen cells (photo by Nick Sloff), (c) drone brood (photo by Nick Sloff), (d) and intense flowering (photo by Katy Evans).

drone brood, and increased flowering intensity. However, waiting for all of these cues to be evident runs the risk that the colony swarms before you can act. Many beekeepers split early in the season, about 4-6 weeks prior to the peak floral bloom. This allows ample time for bee populations to build up and produce enough honey for harvest. If you are splitting a colony before queen cells are present but you don't have access to a queen or queen cell, it is not uncommon to let the bees rear a queen from worker eggs. Nonetheless, a common mistake is to split a colony that is too small; it is advisable to wait until the colony is at least two, preferably three, hive bodies tall and seems crowded.



A congested colony indicating that it is time to split (photo by Katy Evans).

Step 2 - Once you have decided it's time to split, the second step is to gather your equipment including a smoker, hive tool and an empty hive. For the specific method outlined here, it is important to split on a sunny afternoon (above 50°F) when the bees are active. This ensures enough bees are foraging (see step-5), plus the bees will be relatively gentle and the queen easier to find. To make the transfer of frames easier, I set up the empty hive close by the colony that I will split.

Step 3 - Now you will need to find the queen. Finding the queen takes experience and can often be difficult for beginners. Two options to make her easier to find are (i) a few days in advance, find and place her in the top or bottom super with a queen excluder or (ii) marking her with a paint marker (purchased at a local office supply). Once you have



A marked queen. In general, it is easier to find a marked queen and allows you to monitor her throughout the course of the season. A paint marker can be purchased at a local office supply (Photos by Katy Evans).

spotted the queen, move her along with the frame she is on to the new colony (*referred to as "daughter colony") to prevent injuring the queen. While searching for the queen, be careful not to damage any queen cells. These are typically found along the bottom edge of the frame, but it's not uncommon to find them on the



Capped queen cells resemble a peanut in which the queen emerges from the tip. They are usually found along the bottom edge of a frame. A colony can rear as many as 25 queen cells (Photos by Nick Sloff).

faces of comb. You may see anywhere from 5 to 25 queen cells in a colony at one time.

Step 4 - After moving the queen, you should divvy up the original colony's (*referred to as "parent colony") resources (pollen and honey) equally between both colonies. I would not attempt to shake or remove bees from the frames as this will agitate them. Be sure to retain all the brood and queen cells in the parent colony; if a queen cell is placed in the daughter colony with the laying queen, it could stimulate a swarm.

Step 5 - Now you will have to switch locations of the colonies, placing the daughter colony in the same location as the parent colony. Because the majority of bees remained with the parent colony, the daughter still has relatively few bees. After moving the daughter colony, its population will quickly rebound since the foragers - which comprise about 1/3 of the colony's population - will return to the exact GPS location where the parent colony had been. Provide the daughter colony with empty frames and a super to allot more space for the queen to continue laying and foragers to store resources. The majority of bees that remained in the parent colony are nurse bees that have yet to leave the hive and make their orientation flight and, therefore, will return to the new location that you choose for the parent colony, whether it be the same or a different apiary. As adult bees emerge, the population should grow and a new queen will soon begin laying.

At this point, you can leave the parent colony to rear a new queen or alternatively introduce a queen cell

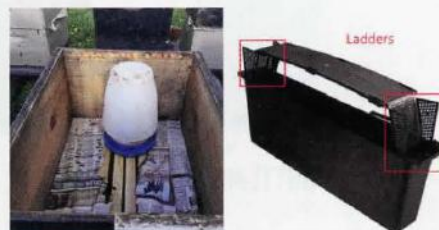


A purchased queen in a three-hole Benton queen cage. Purchased queens commonly arrive in a three-hole Benton queen cage along with 2-3 worker attendants that feed and groom her during transit (Photos by Nick Sloff).

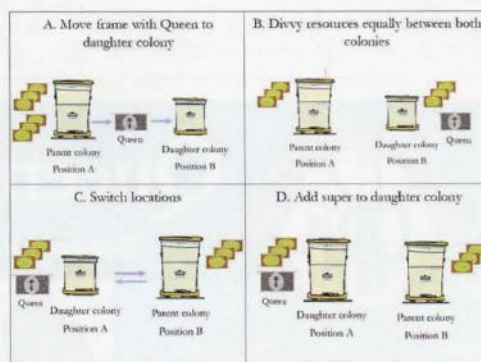
from another colony or a mated queen with specific genetics. If introducing a new queen cell, you should do it immediately. If introducing a mated

queen, wait three full days before doing so and remove any existing queen cells otherwise the bees could reject her.

It will take on average of three weeks before you will spot eggs, so it is important to be patient. If the weather does not permit foraging or you are splitting early before full floral bloom, supplemental feeding is recommended. Feeding can be done by adding frames of honey or alternatively by using a mason jar, chicken feeder or a division board with sugar syrup.



Examples of methods to feed a colony including a chicken feeder (a) and a division board (b). With division boards, it is best to include an object that the bees can land on so they do not drown (e.g. ladders or styrofoam balls).



More details about swarming biology and a step by step animation of splitting can be found in the video "Colony Division: an easy method to split a colony: www.extension.psu.edu/colony-division-an-easy-method-to-split-a-colony. Good luck and happy beekeeping!

I would like to acknowledge Craig Cella for his ideas on colony splits, Jamie McLaren for reviewing article drafts, and Nick Sloff (Entomology department, Pennsylvania State University) for sharing his photos. The video was developed in coordination with the Entomology department at Pennsylvania State University and Penn State Extension.

*In the video I refer to the parent colony as "original colony" and daughter colony "split".



Beekeeping In A Vacuum

Lose The Echo

Lance Hawvermale

Mentors are a must for new beekeepers. Hands-on classes help tremendously. Conventional wisdom says to attend a club meeting, make friends with experienced beekeepers, participate in a class, and then have your teacher close by your side as you install that first package or nuc.

But what if you have no access to such assistance? What if, like me, you fell in love with beekeeping from afar but could find no ready instructor or nearby club?

You can be a successful solitary beekeeper if you Read, Watch, and Explore.

1. READ

Everybody knows we can learn a lot from books. But what about catalogs? Surprisingly, the aspiring beekeeper can absorb considerable knowledge by browsing any of those voluminous catalogs published by the big beekeeping-supply companies.

“What on earth is a Porter bee escape?” I wondered, seeing several listed for sale. Who was Porter? And why did he want his bees to escape? I used my phone to research these items. A few minutes later I understood the function of this important piece of beekeeping kit. Catalog-browsing inspired me to learn about all sorts of arcane apparatus.

Self-Taught Rule #1: Request company catalogs and browse every page.

Books, of course, are even better. In these days of ever-changing multimedia, books remain the steadfast champion when it comes to teaching us things we never thought we needed to know. Ever since beekeeping picked up steam in the 1800s, countless books have been published on the subject, examining everything from the construction of top-bar hives to the biology of the bee gut. Whether you're interested in carpentry, gardening, lip balm, or science, there is a bee book just for you. First, find a sub-topic that interests you, such as first-year beekeeping or queen rearing. Second, hunt down used books that may be out of print; older books may contain

fewer fancy pictures, but there's a lot of mainstay wisdom in those yellowed pages.

When I first felt the distant call to learn about bees, I poked around some dusty shelves and found *Practical Beekeeping* (Garden Way Publishing, 1977) and studied every black-and-white line drawing. I followed this with *The Beekeeper's Bible* (HarperCollins, 2010), with its gorgeous illustrations. These books could not have been more different in regard to their production values, which is why they were so helpful to me; they allowed me to see beekeeping through very different lenses.

Self-Taught Rule #2: Collect and read beekeeping books. www.beeculture.com

A hybrid of book and catalog, honed with the timeliness of a newspaper, the magazine might be the best source of information for the beekeeper who is learning on his or her own. Some periodicals are academic journals that cater to the scientific crowd, while others enjoy a more general purpose audience. Treasures can be found everywhere: in the letters to the editor, in the industry news, and even in the advertisements. The strength of a magazine is that it compiles knowledge from a variety of viewpoints. People in remote villages are keeping bees in hollow logs at the same time that cutting-edge scientists are using nuclear magnetic resonance to authenticate honey. It's a rich and wonderful world, and the beekeeping magazine brings all of it together, twelve times a year.

Self-Taught Rule #3: Subscribe to at least two beekeeping mags, Bee Culture and BEEkeeping Your First Three Years.

2. WATCH

In the absence of a mentor by your side, your surrogate instructors are the beekeepers in “how-to” videos. You've read about a walk-away split, but how does it actually look? Sifting through the multitude of on line beekeeping videos can be intimidating, especially when each beekeeper has

a personal opinion about everything from queen excluders to *Varroa* control. To narrow the field, check out the list of recommended videos below.

Self-Taught Rule #4: Discover the “vloggers” who have a beekeeping style that appeals to you.

3. EXPLORE

Visit local stores, especially the farmers' markets and health food vendors. Stand before the honey section and read the labels. Take a jar in your hand. Feel its weight. Make note of its source of origin. Does it claim to be raw, unfiltered, flavored, local, organic? Find out how each of these words applies to honey production. When you harvest your first few jars and pass them around to friends, how will you describe the contents? If you could have any image on your own honey label, what would it be? What plants can you add to your garden for eager pollinators?

Self-Taught Rule #5: Keep your eyes open and think like a beekeeper, even if you're not one yet.

Ultimately, you're on your own. Books, magazines, and videos can improve your beekeeping IQ, but beekeeping wisdom comes only with experience. The solitary beekeeper has two best friends: trial and error.

Recommended Reading

Mann Lake Beekeeping Supplies Catalog

The Beekeeper's Problem Solver (ISBN 978-1631590351)

The Backyard Beekeeper (ISBN 9781631593321)

The Hive and the Honey Bee (ISBN 9780915698165)

The New Complete Guide to Beekeeping (ISBN 9780881503159) ...and of course Bee Culture!

Recommended YouTube Channels

A Canadian Beekeeper's Blog

Barnyard Bees

U of G Honey Bee Research Centre

Walls Bee Man ...and any video featuring Dr. Jamie Ellis

