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Bee Culture

October Features . . .

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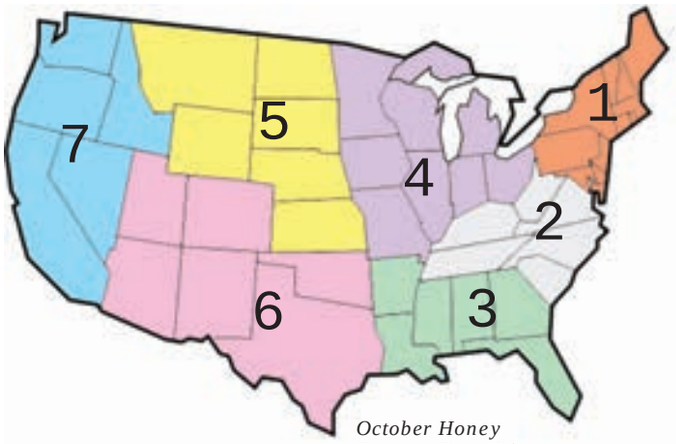

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Bee Culture

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Beek Terminator 2.0

Beek Terminator 2.0? Are you nuts? The last thing I need is some expensive, high-maintenance, new-fangled robot beekeeper contraption that probably can't kill bees any faster than I do already, and takes up more room in the basement than my boomerang let's-move-back-in-with-mom-and-dad-after-college offspring.

If God had intended us to have robot beekeepers, would she have made beekeeping so darn difficult? Think of what I'd miss if I were replaced by your robot: a chance to work outdoors in 60 mph winds and occasional (frequent, actually) downpours, a chance to breathe healthy air only lightly tinged with oxalic acid fumes and smoker smoke, and how about the chance to apply bee venom apitherapy to some really interesting parts of my body? No more bench-pressing hive boxes in a cloud of irritated bees? No more discovering that my hives are a veritable insect zoo of moths, beetles, ants, mites and sundry other visitors that I never started with? Savoring the musky (nasty, actually) odors of AFB and EFB? Scratching my head over deadouts that were full of bees only a week or two earlier? You want me to turn over my beekeeping to a machine?

No, no thank you very much! If you are so keen to replace some occupation with robots, may I suggest politicians?

David W. Lewis
Cheyenne, WY

Thank You *Bee Culture*

Your Customer Service has been so great, I am writing to say Thank You!

From when I sent for a sample copy to now (last month), when I needed a replacement copy. I really appreciate your service.

I enjoy *Bee Culture*. I can tell everyone works real hard to get it out each month.

I've really enjoyed the past few month's letters to the editor, very interesting.

Neal Cunningham
Hillsboro, VA

Is Ross Conrad Misleading??

Ross Conrad makes some thought provoking points in his September 2020 article entitled Synthetic Wax – BetterComb and the Demise of 100% Beeswax, including the potential for its use resulting in undetectable mixing of synthetic and natural wax.

However, some of his arguments against the use of synthetic wax could be potentially misleading to the reader. For example, it is not an established "fact that honey bees have a physiological need to produce beeswax." Wax production is up and down regulated naturally based on need and resource availability. Wax production is resource intensive. Given the choice, I believe honey bees would rather not make wax.

In addition, the notion that bees need to produce wax in order to detoxify, just like we produce sweat in order to remove toxins is simply untrue. Although there can be toxins released in human sweat, sweat's primary purpose is to cool the body. Sweating accounts for less than 1% of toxin release in humans – we have a liver, kidney, and gut for the rest. Similarly, although honey bees do release toxins in wax, it is not a significant mode of detoxification. Wax glands develop in the honey bee at around 2 weeks of age. About a week later, honey bees begin to lose the ability to produce wax as they reach foraging age (though wax glands can return to functionality if there is a need). So there is only a brief period during a honey bee's life where they are actually producing wax. Xenobiotic detoxification in honey bees occurs primarily through the conversion of waste and foreign substances to excretable metabolites via cytochrome P450 monooxygenases and other enzymes and then through transport out of cells in the mid- and hindgut for excretion.

I have never used synthetic wax and have no stake in its use. However, I believe it could have a place, including faster package and nuc build up (potential uses which were noted by Mr. Conrad) as well as potentially facilitating more rapid honey production.

Although I believe Mr. Conrad's concern about the potential for unwanted mixing of synthetic and natural wax is valid, some of his other arguments against the use of synthetic wax are not consistent with what we know about honey bee biology and ecology.

Greg Shelley
Stroudsburg, PA

Ross's Response

Hi Greg,

Thank you for your response to the synthetic wax article. I appreciate it when someone makes me stop and reassess my positions and beliefs.

I think you are correct when you say that it is not an established fact that honey bees have a physiological need to produce beeswax, if your talking about a single bee. We must remember however that the honey bee is a super organism and is not capable of surviving long without the rest of the hive. I believe that the need for the honey bee as part of the super organism to produce beeswax is unquestionable. The colony needs to build comb to raise young, store food and communicate, as well as cap honey cells when full and ripe, and more. I should have been more specific to avoid possible confusion.

Regarding the question of detoxification, you are also correct

that neither the human skin nor the production of beeswax are primary methods of human nor honey bee detoxification. However, this does not mean they may not be important methods of detoxification. In some instances, the extra 1% of toxins that the human, or bee, is able to sweat out through perspiration or wax may mean the difference between life or death, especially if other modes of detoxification are compromised. I believe that nature does not give organisms the ability to do things that are unnecessary. It certainly creates redundancy, but that provides resilience and should not be considered unnecessary.

I admit that while I appreciate science, I don't always base my opinions or articles solely on what science has discovered about honey bee biology and ecology. First of all, science is not always right. Science is simply our best guess as to the reality of the world based on all the information available at the time and since we are always learning new things, "established" science is always changing. Another problem with science is that it is limited to what it can objectively measure and collect data on. As a result, for example, love does not exist to science since it cannot be weighed, measured or otherwise objectively documented. Science is also painstakingly slow. It takes a lot of time, and often money, to run experiments and get the results published. Not only does this delay the dissemination of information but in the process, it creates an unlevel playing field providing certain individuals with inside information that can leave others at a disadvantage. And finally, science only explores the areas that scientists have endeavored to ask questions about. Very little science in the U.S. had been conducted on the microbiome of the honey bee 15-20 years ago when myself and others were warning of the detrimental impacts on the bee's beneficial bacteria from using antibiotics in the hive. Studies that have been conducted mostly in the past decade or so are now confirming this concern.

I am grateful for your questions as it provides me with the opportunity to reflect on my beliefs and opinions to evaluate whether they are still valid, or if I missed some important information that would necessitate revising my position on an issue. Thank you for keeping me on my toes.

Ross Conrad

The bee is more honored than other animals, not because she labors, but because she labors for others.

Saint John Chrysostom

Jerry Hayes

I hear all the time about Big Ag. from people complaining about the structure and process while they have a mouth full of food. So, I thought that I would select at random some people I know and ask them the general question " If I said the words Big Ag, Production Ag to you what are the thoughts that come to your mind?"

I got more comments than I had anticipated. Everybody has an opinion and I certainly do so answering was easy. But there is a person Ross Conrad, who writes for *Bee Culture* and other magazines who is probably more connected to environmental reality than I am. I asked Ross to comment on each of the 'comments and concerns' with me so we could expand the view. He was kind enough to do this and it was very enlightening to me. I hope it is for you.

Here are the spontaneous comments and concerns from the question "If I said the words Big Ag, Production Ag to you what are the thoughts that come to your mind?"

Look at all the nitrogen runoff polluting lakes, rivers, Gulf of Mexico, Lake Erie.

JH At the end of the day Yes it is unnecessary. Because I live in Ohio now I for some reason get email updates from NOAA titled 'Lake Erie Harmful Algae Bloom Forecast'. The 'bloom' is caused because of production Ag. runoff into creeks, streams and rivers that empty into Lake Erie. And not to pick on production Ag. because I do like to eat cheaply in the U.S. But, farmers only are provided products that runoff in a rain storm which is not a good thing. We can send 'Rovers' to Mars but can't apply nutrients that won't stay around a plant?? And did you know that the recommendation is for four to six lbs of nitrogen be applied to each suburban lawn yearly. Think about what is applied to Golf Courses running off.

RC It's not necessarily big production Ag. but industrial agricultural practices that are the issue. Healthy soils are not as susceptible to erosion. By switching to no till or conservation tillage, cover cropping, and diverse crop rotations, run-off and soil erosion drops precipitously. There are large farms doing a good job with these supposedly "alternative" practices that have been around for centuries as they really just mimic nature. They may not be the recommendations from the seed and chemical companies, or even the Ag. schools and Extension agents, but they work wonderfully, are time tested, proven, and cost less money to implement.

Pollinator declines because of pesticides, herbicides, loss of native flowers.

JH We all pick on production Ag. because of the amount of land required to feed us and the world. And the crop protection tools needed as well to provide the highest production do cause pollinator declines. But, let me pick on you and I for a moment. There are approx. 50 million acres of suburban lawns in the U.S. requiring 18 million pounds of chemicals and 10,000 gallons of water each, above and beyond natural rainfall, to keep them looking like the 18th hole at Augusta. Grass lawns are a black hole for the environment and do -0- for ALL pollinators. We can do better.

Ross Conrad

RC There is scientific consensus that pesticides are playing a role in the decline we are seeing in pollinators.

When cover cropping, crop rotations and no till or conservation tillage practices are adopted, farmers find greatly reduced need to run the chemical treadmill. Even when farmers who take up such practices experience a drop in yields, the reduced input costs from not having to buy and apply all the pesticides more than make up for the smaller harvest making the farm more profitable.

Loss of small farms and farm families

JH Look where suburbia is now. It is on the cleared flat accessible land around growing towns and cities. The best, most naturally fertile land usually is snatched up for the next development because it's easy to buy. 80% of the US population lives in these urban suburban areas. What is left is secondary land that needs more chemical inputs to be fertile. Makes no sense. Farming is hard precarious work that many sons and daughters of family farms simply don't want to do.

RC Part of the cause of our loss of small family farms is competition from industrial Ag and the undue influence it has on our political and legal system. Large agribusinesses have the deep pockets that allow them to buy politicians (legally) and get them to pass laws that benefit them (Industrial Ag) often at the expense of the small family farm. Challenges in farm succession and the ability to pass the farm on to the next generation which are mostly economic, along with the increased demands of urbanization and land development that put agricultural land and those that work it at risk.

Ag. as it currently exists is unsustainable.

JH With a growing population, loss of topsoil because of poor land management and then the need for more fertilizer and more chemical inputs from Big Ag. Chemical Co. farming in the future will be more hydroponics as the soil is just the substrate to hold the plants rather than farming in real soil. But we all have to eat and so nothing will change ultimately. And those that have money and go to Whole Foods (Whole Paycheck) will have better nutrition than those that can't.

From The Editor —

RC Most of the systems our culture is built around are unsustainable. To paraphrase a perceptive beekeeper from New York state, they can change the bed sheets all they want, but they are still on their deathbed.

Big Ag. is there to dominate and take our money.

JH It's a corporate business with stock holder investors wanting more $$$. Welcome to the business world. Dollars come first if you want to keep your job. Doing the right thing generally doesn't make money for stockholders i.e. you and I and our 401K.

RC This is the crux of the problem. We try to apply industrial capitalistic principles and systems to an inherently biological process and it simply does not work well except of course for the businesses that provide pesticides, farm machinery, and financing.

- Food nutrition is less in production ag. than my backyard garden.

JH Sure it is. But of the 330 million citizens in the U.S. and 80% live in urban suburban areas the chances of getting folks to do anything are slim and none.

RC Thankfully there is growing interest in locally grown food. Even in cities, rooftop farms and community gardens in abandoned lots are popping up like mushrooms. The pandemic has sharpened people's focus on the role nutrition plays in our health as consumers seek to feed their families the healthiest food possible.

Why is there Big Ag.?

JH Because as currently organized production agriculture can produce basic food items more cheaply than any other system. It is supply and demand based on cost.

RC Because our economic system is designed to encourage people to try to make profits any way they can. Economy of scale and advanced technology allow industrial scale farms for now. Big Ag is only profitable however because, as any good capitalist knows, to be profitable you need to externalize as many of your costs as possible. Thus, you and I (the taxpayers) pick up the tab for the damage done from soil erosion, nutrient run off, chemical contamination and non-target exposures, increased green house gas emissions, farm research, exploited farm workers, and the agricultural subsidies that mostly benefit large agribusinesses.

Isn't organic production better for us and the environment?

JH You ever looked at the list of chemicals one can use on a crop to meet Organic Certification? Take a look; **https://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&SID=9874504b6f1025eb0e6b67cadf9d3b40&rgn=div6&view=text&node=7:3.1.1.9.32.7&idno=7#sg7.3.205.g.sg0**. So tell me what 'organic' food production on the scale needed in the U.S. is.

RC Absolutely. While Organic food production is not perfect, it is way better than industrial Ag. From reduced green house gas emmisions, to reduced soil errosion, greater biodiversty, fewer toxic chemical contaminants and pollution, flood and drought resilience, higher profits, and even in many cases, more nutritious foods, organic agriculture trumps industrial Ag hands down. Word is getting out which is why sales of organic food and non-food organic products is growing at twice the rate of the non-organic alternatives. Organic food is simply what the consumer prefers, though unfortunately, many can not afford it.

Concentrated food production increases biological weakness of crops being grown to pests, and diseases.

JH It is a battle in a Corn field, or soybean field or – amongst pest, parasite and disease. When you have 5,000 acres of a crop that is planted six inches apart and has to have growth promoters like fertilizers because the soil does not have the capacity to feed all those plants what is the alternative? And pests and disease look at this opportunity with a concentrated food source so they can reproduce. They become resistant to controls and it is a constant battle to see who wins.

RC Monocultures, high chemical inputs, and genetic engineering are about maximizing convenience and profit, not biological health and vitality. When farmers turn to crop diversity, rotations, no or low till, and cover cropping, soil health increases which results in pest pressures decreasing, and crops developing disease resistance, all of which means fewer pesticides are needed.

Isn't local, regional food production better? Less negative environmental inputs of fertilizer and chemicals.

JH I think the only advantage of local regional food production is less transportation and less diesel exhaust into the atmosphere.

RC Transportation is an important part of the equation, but only one part. More jobs and increase money circulation in the local economy, local food resilience, fresher and more nutritious foods are also benefits imparted by local and regional food production. Decreased chemical pesticide and fertilizer use is simply a farmer choice, local or not. Locally produced food is also much easier to access during times of crisis.

Isn't Big Ag. contributing to Climate Change?

JH Sure they are. But so are we with our cars, lawns and houses sucking up resources. Who is the worst? I don't know.

RC While agriculture's share of GHG emissions is officially in the 15 percent range, the reality is that it is much higher. The calculations do not take into account the GHG emissions and loss of carbon sequestration that results from the clearing of the world's forests so the land can be put to agricultural use, the long-distance transportation of crops, the extensive need for refrigeration during transport along with storage, packaging and food waste. When everything is considered, agriculture and the activities industrial agriculture requires and encourages actually accounts for 35-40 percent of all our GHG emissions, with giant agribusinesses leading the way. We will never get a handle on the climate crisis until we radically change the way we produce the bulk of our food.

GMO's and Frankenfood doesn't help us.

JH They do if we can't control pests and diseases using chemicals. But then it is dollar battle again. Think of herbicides like Roundup or Dicamba that were designed

with the GMO business plan that if we make a herbicide resistant plant then we can sell more herbicide and we have a double money maker.

RC GMO's are promoted under the false ideas that they are necessary to feed the world, that they will result in less pesticide use, they are substantially equivalent to their non-GMO counterparts, and our blind allegiance to the latest technological advancement as if all new technology is better. The unresolved issues surrounding GMO's is so vast it really deserves an article all its own, but for now here is a partial list:

- use of BT GMOs are leading to pest resistance which hurt organic farmers who no longer have the BT tool to rely on in order to avoid toxic chemical pesticides

- Use of GMOs have also led to a dramatic increase in the use of pesticides in agriculture, the opposite of what industry claimed would happen.

-The genetic engineering of honey bees will introduce patents and privatization to pollination, one of the last bastions of agriculture that is the one area Big Ag doesn't yet control. And pollination is huge, worth up to $577 billion annually world-wide.

- Researches have found that Engineered genes can jump species. Bioengineered genes in pollen have been incorporated onto the beneficial bacteria that inhabit the honey bee's digestive system.

- Epigenetics is fairly new branch of science and still being understood. We really don't have a clue how varying environments impact all genes and yet we are manipulating and changing genes thinking we know how they will respond.

-We used to believe in the false notion that each gene only impacts a single trait when we now know that a single gene can impact more than one trait. For example it has been found that a single gene for one trait is also responsible for producing certain proteins. Is it just a coincidence that the number of people with autism, allergies to soy, and that those suffering from celiac (leaky gut syndrome) and are gluten intolerant have greatly increased since the advent of GMOs?

- The development of most GMO organisms and technology has been publicly funded by government agencies, but privatized by corporations for profit in what amounts to a corporate welfare system.

- The new paradigm of corporate secrecy that often denies scientific researchers from being able to independently test GMOs leaving those with economic conflicts of interest in charge of the research and data we rely on for safety evaluations.

- When independent research has been conducted and has found serious questions about the safety of human ingestion of GMOs and products derived from GMOs, the industry attacks the researchers personally and seeks to discredit them rather than question actual scientific facts and findings. This creates a chilling effect that discourages additional research.

- Genes are part of living organisms that mutate, migrate and reproduce. Once they get out into the environment there is no calling them back if something unexpected goes wrong. They, in effect, become biological pollution.

- We simply do not know enough about gene editing/addition/subtraction to know that we are sure to avoid catastrophic consequences and there is little to no regulation of these novel life forms. The dearth of meaningful regulation combined with the wealth and power of today's global agribusinesses creates a very risky situation, especially since the people who run corporations are shielded from liability for the damage their actions may cause.

What is a farmer? What is a Good farmer?

JH I read one time that anybody can farm, but everyone can't be a farmer. Here is a list I like.

Realizes that his farm is an organic unit in which all the organs must function in cooperation and reciprocation.

Realizes that the fertility of the soil is the life-blood of his farm and that this fertility is not static, but is a dynamic and perishable balance.

Realizes that humus is the mainspring of fertility.

Realizes that for each part of the farm there is a best natural use of the land, and conforms to it as far as possible.

Realizes that climate is the most powerful single factor affecting crop production; that it cannot be controlled, and should not be fought against, but cooperated with.

Fights insects and diseases firstly by prevention and uses poison sprays, dusts, etc., with caution and reluctance.

Realizes that grass is the earth's most important crop, takes care of his permanent pastures, and uses temporary pastures to protect and replenish his soil.

Realizes the importance of the genetic constitution of his plants and animals, and makes use of breeding to improve quality.

Has the energy, tenacity, and organizing ability to keep the farm clean and tidy, and to keep clear records.

Realizes that he knows next to nothing of all that there is to know, that he is dealing with eternal laws that he did not make and cannot alter, and that the most brilliant achievements of human knowledge are simply the closest obedience to these laws.

https://www.plough.com/en/topics/justice/environment/definition-of-a-good-farmer

RC To me a good farmer prioritizes quality over quantity and adopts practices that improve their community, the land, air, soil, water, and diversity of life on and around the farm. Good farmers provide a public service.

Ag. needs investment for more research breakthroughs?

JH I think that this is true but I think we as stewards of this earth have not done a very good job of taking care of this stewardship to maintain, preserve and improve the fundamental environment we have been awarded on this earth. The research breakthroughs we need are for ourselves to change behavior and how we treat this earth for the future generations.

RC I would suggest that instead of more research and scientific breakthroughs, we simply have to remember and relearn what generations before us knew and did. So many of today's agricultural problems have been caused by our moving away from many of the traditional farming

⇨

techniques that somehow became considered outdated and obsolete, and technological innovations mostly implemented due to the desire to make *farming easier and more convenient* (an oxymoron). Beekeeping is no exception. Old time beekeepers for example knew how to control and eliminate American and European Foul Brood without the need for antibiotics and the issues of honey contamination and resistant diseases or burning up the entire hive. Ultimately, we need to have more respect for the knowledge and wisdom of those that came before us and take time to remember and relearn what good land stewardship and animal husbandry is all about.

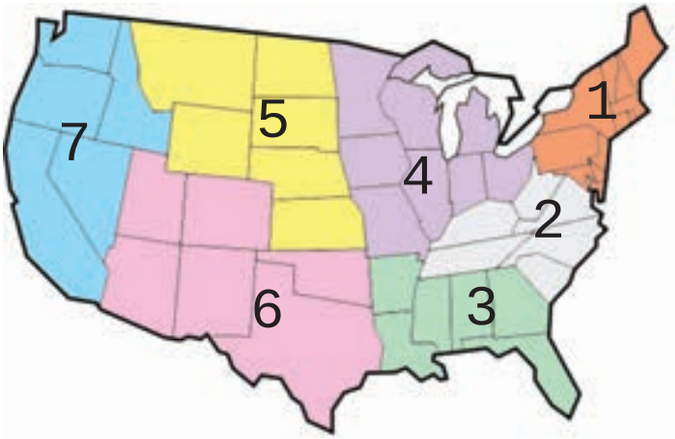
I was asked by one person, "Are you a 'Shill' for Big Ag."

JH I really have found out I don't like Big Corporations. I like the people who run them as individuals mostly but when the business model is make a buck above and beyond truth, respect, morals and ethics to be used consistently and the employees do it because they need a job because they have a family and a mortgage, and bills to pay not much choice in this world. Nobody speaks to truth, or you get ostracized or fired. There has to be a limit but very few have one. It is disappointing.

RC I had a similar question when Jerry first accepted a position working for Monsanto years ago. How could someone who obviously appreciates the wonders of the honey bee so much, sell out in such a big way? But now I think that he took the position out of a sincere desire to act as a bridge between the Agribusiness that became synonymous for all that is evil in corporate America and the rest of us. As his response above indicates, he was naive at the time, but has learned much since then.

BC

OCTOBER– REGIONAL HONEY PRICE REPORT



Honey Sales And Marketing

We asked our reporters this month about their honey sales and marketing. We wanted to know about prices, volume and how would they increase volume if they needed to. Of course this report gives some of this data every month. Look at the last month column, and the last year column to see how prices move over time. This information is a good indicator of how the market is moving, and if you should consider making changes in your operation to stay current with pricing.

First, we asked what they will do with prices for their new crop. 28% are going to raise their prices this year, 5% are going to lower their prices, while 66% are going to keep their prices the same for this crop.

Given these plans we wanted to know what kind of sales volume they were experiencing, that is, how much were they selling compared to previous years. A third of those responding indicated that their sales were increasing this season, certainly a good sign, but just over 20% indicated sales were down, and several indicated this was due to opportunities lost due to the virus. But just a hair under half indicated no change in sales volume.

For those who want to increase sales, three quarters felt they didn't have to do anything different, while some 15% plan on advertising a bit more.

We also wondered about activity getting ready for the down season. Close to 80% were sampling and treating for *Varroa*, just over half are feeding sugar or pollen subs, fewer than 10% were treating for nosema, AFB or beetles, nearly half were combing weak colonies and a quarter were requeening.

	REPORTING REGIONS							SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.00	2.28	2.23	1.84	2.31	2.12	2.55	1.52-3.00	2.18	2.18	2.13	2.22
55 Gal. Drum, Ambr	2.00	2.28	2.05	1.77	2.00	1.98	1.85	1.40-2.55	2.02	2.02	2.06	2.09
60# Light (retail)	218.10	201.80	195.00	195.75	155.00	171.28	197.50	134.84-325.00	206.28	3.44	199.53	207.85
60# Amber (retail)	212.91	202.60	187.50	185.75	212.91	168.71	195.00	125.84-325.00	200.40	3.34	208.00	205.98
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	80.00	80.63	105.60	88.00	61.20	109.48	109.48	60.00-194.40	91.76	7.65	90.69	93.90
1# 24/case	96.00	126.20	132.93	113.20	120.00	119.40	144.00	84.00-192.00	129.58	5.40	136.00	129.57
2# 12/case	94.00	123.00	119.57	93.70	96.60	96.00	132.00	72.00-192.00	111.50	4.65	118.70	117.60
12.oz. Plas. 24/cs	85.00	107.04	80.00	90.40	83.76	101.40	108.00	66.00-168.00	98.17	5.45	99.39	101.55
5# 6/case	125.00	117.88	190.50	95.49	113.16	105.00	144.91	71.50-240.00	134.07	4.47	136.85	133.62
Quarts 12/case	150.00	170.00	132.10	153.36	135.48	155.70	180.00	114.48-222.00	157.41	4.37	161.58	150.70
Pints 12/case	120.00	106.24	65.00	89.28	99.49	109.00	102.00	60.00-140.00	98.99	5.50	95.53	91.14
RETAIL SHELF PRICES												
1/2#	5.00	5.11	5.13	4.25	3.87	2.49	5.35	2.49-9.00	4.95	9.90	5.27	5.24
12 oz. Plastic	5.00	7.19	5.95	5.05	5.57	5.99	5.40	3.79-12.00	6.23	8.31	6.19	6.10
1# Glass/Plastic	8.00	8.72	8.76	6.47	6.82	6.79	9.00	4.79-14.00	7.89	7.89	8.18	7.98
2# Glass/Plastic	14.00	13.78	15.28	10.35	13.30	12.50	12.47	8.39-21.50	13.04	6.52	13.97	13.22
Pint	13.00	11.43	9.00	12.00	12.67	10.98	12.77	6.00-22.00	11.40	7.60	10.94	10.57
Quart	18.00	20.04	16.38	15.61	22.56	17.60	20.00	9.25-42.00	18.73	6.24	17.88	18.66
5# Glass/Plastic	25.00	27.00	44.00	24.00	19.78	22.33	29.49	13.60-50.00	27.17	5.43	28.90	26.68
1# Cream	8.00	8.25	8.00	9.00	7.75	10.58	16.00	6.99-16.00	9.66	9.66	10.10	9.83
1# Cut Comb	8.00	16.63	11.49	12.37	15.00	13.00	15.00	8.00-22.00	12.70	12.70	13.45	12.58
Ross Round	8.00	7.32	10.92	12.25	10.92	10.92	13.75	7.00-15.60	10.54	14.05	10.63	9.93
Wholesale Wax (Lt)	3.00	6.35	5.33	5.88	5.80	4.00	7.00	3.00-11.00	6.46	-	6.72	6.76
Wholesale Wax (Dk)	3.00	5.20	4.28	5.55	5.28	2.75	4.75	2.00-9.00	5.06	-	5.85	5.04
Pollination Fee/Col.	60.00	71.67	70.00	130.00	80.00	94.98	75.00	50.00-160.00	84.96	-	77.73	84.56

NEXT MONTH

Region One
- Wrap hives
- Reduce entrances
- Check colony for size of population
- Do alcohol wash again
- Feed syrup if needed
- Put mouse guards on
- Establish upper ventilation
- Combine weak colonies
- Sleep in

Region Two
- Alcohol wash for *Varroa* / treat if numbers are over 3 mites per 100 bees
- Feed if necessary. Build up food stores
- Combine weak hives
- Replace queens if necessary
- Move nucs together to retain heat
- Put feet up

Region Three
- Sample for *Varroa* with alcohol wash / treat if needed
- Feed if necessary
- Put up wind breaks
- Get ready for the holidays

Region Four
- Wrap colonies
- Put on candy boards
- Monitor mite load / treat again if needed
- Check hive weight. Feed if needed
- Combine weak colonies
- Set up wind breaks
- Don't try to over winter weak colonies
- Install entrance reducers
- Stay healthy everyone

Region Five
- Alcohol wash sampling for mites. Clean up treatment if necessary
- Feed if below 50lbs of stored honey
- Fix old equipment and work on new
- Go inside and get warm.

Region Six
- Combine weak colonies
- Check colony weight
- Feed if necessary
- Replace queens if needed
- Sample for mites and treat if needed
- Wrap hives. Continue to feed if weather stays warm
- Leave them alone

Region 7
- Nothing. It's too cold. Should have prepared earlier
- Feed until it's too cold
- Last sampling for *Varroa*
- Wrap hives
- Get ready for almond pollination
- Move to a warmer climate

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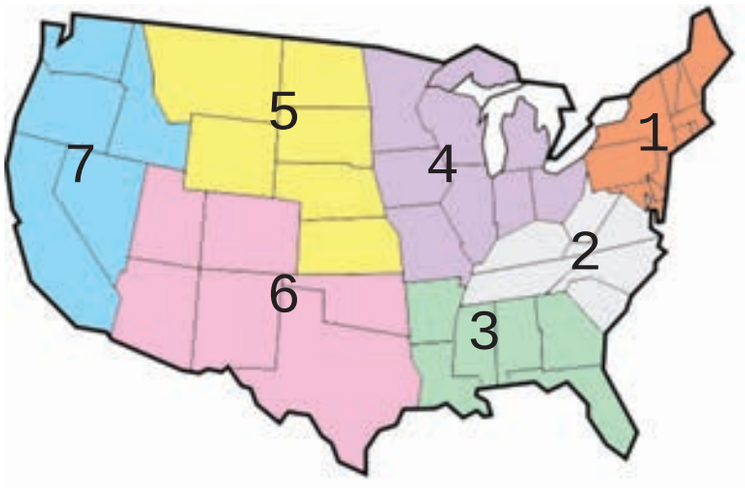

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Apistan, lab study: 95.72% Varroa mortality *(Insects, 2018)*

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

94% Efficacy
Apistan: 94.90% efficacy *(2019, Veterinary Bee Inspector, Spain)*

96% Efficacy
Apistan: 96.92% Efficacy *(2018, Veterinary Bee Inspector, Spain)*

97% Efficacy
Apistan + 50 g Apiguard: 97.97% Efficacy *(2018, Veterinary Bee Inspector, Spain)*

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

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

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

95% Efficacy
Apistan: 95.22% (2017, FNOSAD, France)

Apistan should be used as part of an Integrated Pest Management Strategy
Pockets of resistance are possible, we recommend trialling Apistan on a couple of colonies before widespread use.

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BEE TALK

Send us your questions, we'll find the answers. Our regulars and our guests will share what they know. Send your questions to **Jerry@BeeCulture.com**, *with BEETALK in the subject line.*

A few years back, I read some studies on the use of ascorbic acid (Vitamin C) in bee syrup. I typically add 1/4 teaspoon per litre which brings my syrup pH to ~4.2 to 4.7.

1) I was wondering if any new studies were out or you could speak to the importance of vitamin C and bees (immune system, brood rearing, other biological interactions). I know they can produce their own biologically, but my bees seem to be doing better overall since adding pollen sups & vitamin C to their diet. My bees are stuck in the hive for 6 to 7 months (no cleansing) and we get average temps of -20C with lows down to -40s.

2) I also know many folk like to acidify their syrups using other products. I'd rather do it with a product that is beneficial vs just a pure "acidifier" :). Any thoughts?

Some of my reference studies:

(1) INFLUENCE OF VITAMIN C IN SUGAR SYRUP ON BROOD AREA, COLONY POPULATION, BODY WEIGHT AND PROTEIN IN HONEY BEES, M. Amiri Andi, A. Ahmadi (2014)

(2) SUPPLEMENTATION OF THE HONEY BEE DIET WITH VITAMIN C: THE EFFECT ON THE ANTIOXIDATIVE SYSTEM OF APIS MELLIFERA CARNICA BROOD AT DIFFERENT STAGES, Marek Farjan, Małgorzata Dmitryjuk, Zbigniew Lipiński, Elżbieta Biernat-Łopieńska & Krystyna Żółtowska (2012)

(3) EFFECT OF DIETARY VITAMIN C LEVELS ON THE RATE OF BROOD PRODUCTION OF FREE-FLYING AND CONFINED COLONIES OF HONEY BEES, E.W. Herbert Jr. * J.T. Vanderslice D.J. Higgs (1985)

My wife says I am a bee geek.

A. 1) Reference above, says that Feeding sugar syrup with Vit C in Spring helps brood production.

2) Reference above, data is interesting but I don't know that Vit C is stored in Vitellogenin and would have an effect on *Varroa* as a repellent. It is not lipid friendly.

3) Reference above, indicates it has no effect as honey bees make their own Vit C **https://www.apidologie.org/articles/apido/pdf/1985/04/Apidologie_0044-8435_1985_16_4_ART0003.pdf**

a) Bees are making their own or its coming from microbiome **https://onlinelibrary.wiley.com/doi/abs/10.1002/arch.940020104**

More stuff from Jerry;

https://www.cabdirect.org/cabdirect/abstract/19421403235 Not much in Bee Bread

https://www.scielo.br/scielo.php?pid=S0100-40422010000300004&script=sci_arttext Kind of interesting in how pollen is stored fresh or frozen and loss of nutrients ie. Vitamin C. Parallels with all food storage issues.

Bees are making their own or it's coming from microbiome **https://onlinelibrary.wiley.com/doi/abs/10.1002/arch.940020104**

Welcome to research😊 At a distance it looks as though data indicate that Honey Bees may produce their own Vitamin C as needed. Not much Vitamin C in pollen generally or bee bread, generally. Soooo, is Vitamin C a key nutritional issue seasonally and if the "bee" nutritional precursor availability is not there to make Vitamin C is that supplemental feeding with Vitamin C filling in gaps?

Jerry

A. Hi everyone,

This is the only other recent paper that I've been able to track down, which looks like it's from the same group as the second paper Etienne listed:

https://pdfs.semanticscholar.org/1b33/602d674a91b55fbd0194905adb7832e4f21c.pdf

They conclude that Vitamin C supplementation can decrease Varroa infestation. However, their sample size was small and they didn't measure the infestation rate of the colonies before they started the experiment. We don't know if their control colonies had more *Varroa* than those that received Vitamin C before the experiment started. I'd say this study is inconclusive.

I couldn't find anything else in the major honey nutrition review papers either.

I have to agree with Jerry that this subject could use more research. We know very little about the vitamin requirements of honey bees in general. It's hard to say if Vitamin C supplementation is truly helpful at this point.

Emily Noordyke, Univ. of Florida

THE FOURTH INTERNATIONAL CONFERENCE ON BEE AND HIVE MONITORING GOES VIRTUAL

Jerry **Bromenshenk**

Beekeeper demand for information on electronic hive monitoring and associated technologies is so intense, and new hi-tech tools are being developed at such a rapid clip, that organizers have decided to host a virtual Fourth International Conference on Bee and Hive Monitoring Technologies conference. The idea is to fill in the gap, due to cancellation of the original conference which was scheduled in conjunction with the meeting of the Western Apicultural Society. It is expected to be a completely unique event, not only in content but also in presentation, scheduled for October 5 through 9, 2020.

Some 70 organizations have been invited to present their colony monitoring and associated technologies. Over 40 have been confirmed with entries arriving daily. This is expected to be a mixture of advances in both tried and true developments in colony monitoring, as well as the gamut of possibilities of projects being floated for the first time. The audience for this event is expected to be a mixture of developers, and commercial, sideline, and backyard beekeepers, who will find the presentations informative and useful.

The virtual event will include 15-minute speaker videos, presented via the Zoom platform, in what is described as "conference-like." Also, abstracts will be published. A printed proceeding is also on the drawing board. Following the event, presentations, with the permission of the speakers, will be made available to the public on a University of Montana Facebook Channel.

An idea of the content of this event and its relevancy can be seen by consulting reports on the second and third international conferences. These were held in Missoula, Montana as part of the Western Apicultural Society (WAS) conference in 2014 **https://tinyurl.com/hivmon14** and Hampton, Virginia, in conjunction with the Eastern Apicultural Society (EAS) meeting in 2018 **https://tinyurl.com/hivmon18**

At the most recent meeting, Dr. Frank Linton, known internationally as The BeePeeker, and a pioneer organizer for all previous conferences, delivered the following preamble: "How can beekeepers be alerted to small problems before they become big ones – avoiding either too many inspections or too few? The solutions presented in this workshop principally involve inserting sensors into hives to monitor colony health and productivity remotely. As those in your automobile, electronic sensors in your colonies can keep you informed of your colonies' well-being and alert you to problems early on."

Developers of this virtual conference will arrange speakers by topic. Each group will consist of five to ten short presentations focused on a specific technology or data from an allied study and will have a moderator. Moderators will compile chat comments from the Zoom audience and convene a panel of speakers to address each other and questions from the audience. Finally, one overall goal is to begin discussing the formation of a professional organization to support investigators and pioneers in innovative and emerging technologies associated with bee and hive monitoring.

Conference sessions will be held a few hours each day, over a week. Presentations will be recorded, with live Q&A after each moderated session. Commercial beekeepers will be able to see and talk to the developers of telecommunications to remote apiaries, bee management software, asset marking and tracking, theft protection, mapping software, and more. Backyard beekeepers will see the newest versions of hive scales, temperature and other sensors, acoustic interpreters, and forager tracking, as well.

Registration for this event is $20. Yes, only $20. Registration will be limited to 300 participants for the live Zoom conference. For details, see **https://colonymonitoring.com/events/** BC

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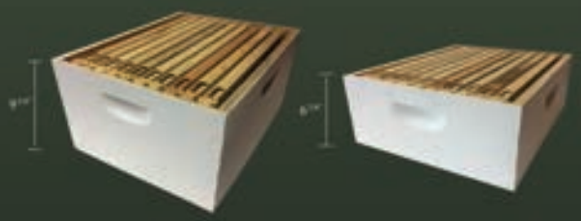

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FOUND IN TRANSLATION

Well Groomed Bees That Defeat Mites

Jay **Evans**, USDA Beltsville Bee Lab

Whether for brood disease or mites, there is strong evidence that tidy bees are healthier bees. Personal hygiene by worker bees is one way for bees and colonies to reduce the impacts of mites. Especially when combined with other resistance traits, self-grooming is an important and selectable trait for mite resistance. Self-grooming compliments the grooming of nearby workers, picking mites and diseased brood from sealed cells, and bee-produced cues that throw off mite reproduction. So how would you, as a queen breeder of any scale, select for this trait in your stock? And is it worth it in terms of colony health? The ultimate measure of mite resistance, short of simply not treating colonies and hoping for the best, involves a top-to-bottom assessment of colony mite loads for both sealed brood and adults. Mite counts of 300 worker bees, especially when repeated over time, offer a good estimate of colony-level infection. These mite counts are critical for determining treatment needs and can also be used for assessing the mite resistance of different lineages, but they do not provide insights into the traits that bring about resistance. Three recent studies tackle cost- and time-effective assays for measuring the personal hygiene of honey bees in the context of *Varroa* mite resistance.

First, Nedjma Dadoun and colleagues in Algeria asked whether personal hygiene alone was a good indicator of colony-level resistance. In their paper *"Differences in grooming behavior between susceptible and resistant honey bee colonies after 13 years of natural selection"* (Apidologie, 2020, freely available at **https://link.springer.com/article/10.1007/s13592-020-00761-6**), they showed that bees in a mite-resistant lineage of honey bees were far more likely to be good groomers. Using a plastic lab arena, they placed mites onto the backs of bees and then observed mite take-downs over the course of three minutes. Bees from mite-resistant stock removed their own mites 60.4% of the time, versus only 6.7% of the time for bees from mite-susceptible stock. This indicates that this trait, while likely not explaining the entirety of mite resistance in these colonies, was a decent indicator of colony-level resistance. They went on to test whether this grooming trait was one that bees learned in their home colony, or whether they were inherently good groomers. They showed that bees exposed to nestmates in a resistant colony had about 30% higher success in removing mites compared to naïve bees with the same genetics, and that the key learning gain was after seven days of exposure in these resistant colonies. Interestingly, this learning boost only happened for bees from other resistant colonies, bees from susceptible colonies seemed to miss the nestmate memo showing how to fight mites, even when those nestmates were of resistant stock.

Nuria Morfin and colleagues have provided two interesting looks at the behaviors involved in mite resistance using 'mite-biter' stock developed at Purdue University. In the open-access paper *"Grooming behavior and gene expression of the Indiana "mite-biter" honey bee stock"* (Apidologie, 2020, **https://link.springer.com/article/10.1007%2Fs13592-019-00710-y**) they demonstrate the effects of 20 years of selection for mite resistance on mite levels and behavioral vengeance by bees against mites. Most importantly, mite loads for this mite-biter stock were 3-fold lower than those observed in a non-selected Italian bee lineage, as determined by 'sticky board' counts. The authors also established that this long-selected line indeed had a passion for tearing apart mites. Mutilation rates of adult *Varroa* mites were four-fold higher in the mite-biter colonies, and the degree of damage inflicted on mutilated mites was 50% higher. To appease those who refuse to work with sticky boards or bee behavior, they also showed that the honey bee gene neurexin, previously linked to bee hygiene, was expressed at levels 1.2 times higher in the mite biters than in control bees.

One challenge in selecting for and maintaining hygienic stock comes from the time needed for traditional hygienic assays, not to mention field assays such as sticky boards and full mite counts. To address this challenge, now-Doctor Morfin and her University of Guelph colleagues developed and validated an even simpler system to test the hygienic chops of worker bees. In the paper "*A direct assay to assess self-grooming behavior in honey bees (Apis mellifera L.)*" (Apidologie, 2020, **https://link.springer.com/article/10.1007%2Fs13592-020-00769-y**) they show that a coating of flour provides a good substitute for actual mites when measuring the self-grooming traits of worker bees. In short, bees that are good at picking off mites are also fastidious about cleaning themselves when doused with flour. They ran trials with both Africanized bees and European honey

⇨

bees. As predicted, Africanized bees responded to both individual mites and flour (20 milligrams, or 0.004 teaspoons) much more quickly than European honey bees. Remarkably, both Africanized and European bees responded twice as fast to the flour irritant than to having a living mite placed onto their backs. Overall 94% of Africanized bees responded to the coating of flour within 60 seconds, as did 64% of European bees, suggesting that this assay could be a rapid-fire way of determining hygienic tendencies across bees.

Whatever your scale of beekeeping and/or queen production, you might be curious to know the extent to which your bees react to their most important biological threat, *Varroa* mites. These papers provide recipes for you to test your own stock and thereby get to know your wondrous bees a bit (bite) better. BC

New Reading For The Fall –

Swarm Control. By Richard Ball. Published by Northern Bee Books. ISBN 978-1-912271-59-7. 37 pages, color throughout. 9.5" x 7". Soft cover. $11.56 on Amazon.

If you are serious about making money with your bees from the honey and wax they make, making bees to sell with your bees, keeping your bees out or your neighbors yard, or worse, off from street lights and stop signs, then managing your bees so they do not swarm is important. And swarming is something they want to do. It's instinct to reproduce, and this is how they do it. And there are lots of ways to make it so they do not swarm. Some of them are nearly natural, some not at all resembling normal bee behavior. But they are all in this book, written by an experienced beekeeper from the UK, who was also the National Bee Inspector for England and Wales for a time.

He starts with the fundamentals – how to find the queen, because every technique he reviews requires knowing where the queen is, and/or knowing where to put her in the final hive arrangement. And once you've found her, how to mark her so it's easier next time. His time frame is early exams in March or early April, which may be too late for where you are, so you may have to adjust the timing a bit to fit your locale, but what you do is still done the same way. But basically, what you do throughout the season is provide room for brood, and room for honey such that there is always more than enough room for all the bees.

But then he goes into several of the common techniques used by beekeepers. The Demaree method basically separates the queen from the existing brood by placing her on drawn comb above the honey and an excluder. You have to destroy the queen cells that will form in the brood nest, which means an extra trip, and possible missed cells.

Pagden, Heddon and Snelgrove all have developed swarm prevention techniques over the years, and all are basically artificial swarming methods to make the bees just think they swarmed, and not having to swarm is a good idea. They are similar, but different, and may, or may not work for you. The grand thing about this book is that in very easy to follow diagrams, it has every method described, what to move where and when and why. And better, it adapts the biology of these techniques to provide broodless periods for non-chemical *Varroa* treatments. Two big birds with a single stone.

But don't stop now. When you have more colonies than you want or need or have time for because of using these techniques, it shows you simple, easy ways to safely unite them back together later.

You have no excuses next Spring now. Bees in the trees will only be a bad dream.

Kim Flottum

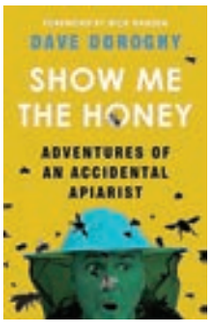
Show Me The Honey. Adventures of an Accidental Apiarist. By Dave Doroghy. Published by Touchwood Editions. ISBN 978-1-77151-322-7. 8.5" x 5.5", 295 pgs., soft cover. Color photos included. $20.00. Available from the publisher and most book sellers.

Dave Doroghy has worked in radio broadcasting and marketing and the last 30 years he has been involved with sports marketing, working with Vancouver's Winter Olympic adventure, and before that with the Vancouver Grizzlies, before they moved to Memphis. Now, he lives on a house boat near Vancouver on the Frazier river that has a colony of bees on the back deck. It's a tidal estuary so the boat rises and falls 15 or so feet daily. The bees were a gift from his sister, who is an accomplished hobby beekeeper, several years ago, and book is about his becoming a beekeeper, with the help of his sister and Jeanne, a close friend and another accomplished beekeeper.

This isn't a how-to keep bees book, but it is about becoming a beekeeper. Dave's perspective of this story is, basically, a non-beekeeper telling other non-beekeepers what happens when....almost everything that can happen to a honey bee colony and an unsuspecting beekeeper happens. Let me repeat, this isn't a beginning beekeeper's book. If you want to sum it up in a sentence, it's what not to do with bees, told in a way that actually will tell you a lot of thing you should do, by showing what happens when you don't do them.

The title of the book is basically his goal – to make money with bees by selling the honey they make. It comes from his sports background, and it is a steady theme in the book.

His adventures are what you would expect from some one who doesn't read much about bees, doesn't take a beginner's class, and doesn't belong to a local association. He kind of makes things up as he goes along, and is then saved by his sister or another good friend.



He talks a lot about getting stung, and the efforts he goes through to prevent that – zippers get a lot of attention, as does duct tape. Moving bees without properly securing the boxes and top and bottom also get some attention, as does the whys of an outyard. He lives in fireweed country and that crop makes the season pretty much every year.

He wrestles with losing queens, queens that don't produce, requeening efforts and feeding, feeding, feeding. And it's sugar he has to feed, one of the worst foods available. And wintering where he is isn't all that bad, but you still have to have enough food, and protection.

Dave's style is humorous, accepting of not knowing what he was doing and what happens because of it, but foremost, he doesn't hide his errors and the results to help others not repeat those same errors. You will see yourself, and others you know in this story. And you will smile a lot. Give this book to someone who thinks they want bees, and tell them here's not how to start. They'll thank you in a couple years for this.

Kim Flottum

What Makes Me Happiest

Besides My Husband, Dog And Bees

Jennifer **Barry**

This past April I took the advice of a good friend. We were chatting on the phone and I was complaining about how depressing the news was and how no matter what source of news I listened to, it was always extremely negative and disturbing. Her reply was, turn it off. "What?? Turn off the news?" And she said, "Why not? If it is depressing you, causing anxiety, not making you happy, raising your blood pressure, then turn it off!" I listened to what she was saying and did just that. Since then, my husband and I have not listened to the news. Some may say we are burying our heads in the sand, becoming complacent, or out of touch, but for now, that's fine by me! Instead we listen to music, interesting podcasts or each other.

With this in mind, instead of talking about Varroa, starvation, beetles or some other depressing topic, I want to share with you what makes me happiest (besides my husband, dogs and bees). I want to talk about plants! Yep, that's right, PLANTS, more specifically flowering plants! When friends come to visit, they comment about all the flowers inside and outside our home. My Dad used to joke about how there was much more oxygen around due to all the plants. "Careful when you light that candle, she may blow!"

There are a number of plants that I love, but my favorites are ones that feed birds, bees, butterflies, and a whole host of other pollinators and/or beneficial insects. Right now, these favorites are thriving at our farm and are very well suited for the Piedmont region of Georgia. I imagine they will grow well in other parts of the country too, but I don't know for sure since I haven't grown them in other parts of the country.

Each day I love seeing all the beautiful life we have invited to our farm by simply providing food and shelter. Walking around this morning I observed swallow tails, bumble bees, monarchs, sweat bees, sulphurs, hoverflies, gulf fritillaries, lizards, toads, carpenter bees, gray hairstreaks, wasps, skippers, long horned bees, buckeyes, skinks, other bees I need to id, an assortment of songbirds and of course honey bees. If you plant them, they will come.

Here are a few of my favorite blooming plants for pollinators or simply named Proven Winners for Pollinators!

Mountain mint, zinnia, coleus, tickseed & Mexican sunflower, blanket flower, passion vine, salvias, coreopsis and Agastache.

They are all easy to care for, don't need any special attention, are self-seeding or perennials and are mostly drought tolerant (except when it hasn't rained in three weeks and the temperatures have been in the mid 90s with no clouds and blazing sunshine). Like all plants, sometimes we just have to water.

Speaking of watering. Did you know that the #1 irrigated crop in America is lawns? Yep, grass, which feeds NOTHING, but maybe our egos. They are termed ecological deserts, because they provide nothing for the environment. Driving down our street, almost every yard is dominated in grass, mowed each week to keep the carpet appeal. And that is just here in my little town, population 1,170. So, what if we could turn all those acres of grass here and across the country into something that would feed pollinators??? Think about how cool that would be! Well, there is actually a movement to turn those acres of nothingness into something and it's planting clover lawns. Wait! Clover??? Yep, I know crazy, because for decades, clover has been demonized as an obnoxious weed by pesticide and turf companies. When I peruse through hardware box stores, I often notice the photos adorned on the herbicidal bottles. Clover and dandelion, pollinator favorites, are usually pictured since we humans consider them weeds. It's encouraging to hear that converting grass lawns into clover is actually happening. The beauty of a clover lawn is you don't have to mow it, fertilize it, use pesticides or irrigate (once established). Even my stepfather is seeing the light and is converting his backyard into a clover field. Now I agree, a freshly mowed sea of green is nice, but a sea of green with little white flowers floating along the top being visited by pollinators - now that's the bomb!

Sorry, I get easily sidetracked, back to the list of favorites. Topping that list is mountain mint!

This is by far my favorite for feeding pollinators! Over 20 years ago, I purchased a packet of wildflower seeds. I planted as instructed and watched as the cosmos, rudbeckia and zinnias began to appear. But there was this one, strange "weedy" looking plant that didn't look quite right. Twice I reached down to yank it out and toss into the compost bin but both times stopped and decided to wait. Thankfully I did, since this has become such a wonderful smorgasbord for so many insects. It is a favorite of all kinds of bees, wasps, flower flies, along with small butterflies and moths. Once they begin to flower in June, they will provide food till frost. The flowers are not showy like zinnias or sunflowers but instead, mountain mint is more understated, with slivery green, silky smooth, oval leaves and clusters bursting with tiny white flowers with purple edges.

Honey bee on mountain mint

Mountain mint

Come to find out, there are several species of mountain mint but the one in my yard is *Pycnanthemum muticum* or short toothed mint. This particular mint is finally getting the attention it deserves. Back in 2013, Penn State Extension Service assessed 88 pollinator perennial plants. Their goal was to find the best pollinator plants that they could promote to growers, landscapers, nursery operators and homeowners. Mountain mint came in #1 for longevity of flowers, diversity of pollinator visits, sheer number of insect visitors and number of bee and syrphid visitors. Out of the six categories that the plants were rated on, mountain mint was #1 in four out of six. As I am learning more and more about our native pollinator plants, there are six more varieties of mountain mint. I can't wait to try them out! Oh, and did I mention, they are deer resistant and drought tolerant?

If you are wanting to try some yourself, I found a company called New Moon Nursery that specializes in native plants. They only sell flats (50 plants/flat) and don't sell to individuals, but would sell to a bee association. If 50 are too many, get with other members of a club and split the order. It is worth it to have this specimen in your garden.

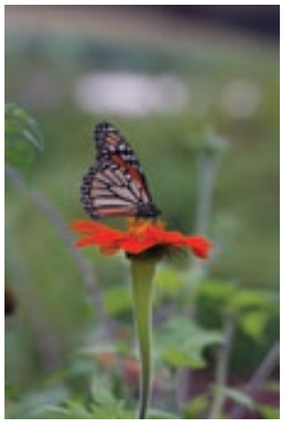
Zinnias

Swallowtail on zinnia

Hello, who doesn't like zinnias? They are such a show-stopper in your garden. Vibrant colors ranging from yellow to purple, white to orange and explosions of red! And the butterflies they will bring. Big ones, small ones, yellow ones too! I love my patch of zinnias and the varieties are boundless. Short, stout kinds or ones four feet tall, anything you want to fill a space. Just don't plant them too close to one another. The only negative thing I have found is they will develop bacterial leaf spot if planted too close to each other. Give them room to breathe and they will fill the air with bees and flutterbys.

Mexican Sunflower

Again, I came across this beauty in a packet of wildflowers. I had never seen this plant before and again have been tickled pink since the discovery. Depending on the species, there are ones around 3' tall to others over 10' tall (they say 4-6'+). I have some that have been re-seeding in my garden for three years now, and they are well over 10' and covered in four-inch, silky smooth, brilliantly orange colored flowers. I wish the photo that I took last year was good enough to print. In one shot there are 15 Monarch butterflies sipping on nectar provided by these plants, just amazing! Bees are also attracted to these sunflowers, they are deer resistant and don't need to be watered too often, unless no rain for weeks. The only downfall I have noticed is when they get too tall, they tend to break during high winds. Too bad, since all those blooms go to waste.



Monarch on Mexican sunflower

Coleus

Coleus

Brilliant, multi colored leaves adorn this plant and the best part, it blooms! Back in the early 2000s, a friend gave me dozens of different varieties of coleus and since then, I put about 500 cuttings each Fall into my greenhouse. They are so easy to grow, and bring such beauty to your garden. Most varieties I have get about 3' tall, remain tightly compacted and show off a range of colors. They usually start to bloom in mid-Summer. Summer blooming plants are great for this region since not much else is available. Bees, especially bumble bees, love the tall stalks covered in tiny, purple hued flowers. The one pictured is my favorite not only because of it brilliant color but because it is was bred at our farm. I call it Berry Fire!

Tickseed sunflower

This is another late Summer, early Fall bloomer which provides pollen for our bees. The leaves of this flowering plant are lacy and somewhat delicate looking, yet, this is a hardy plant that can tolerate full sun to a good bit of shade; however, flowering is minimal with heavy shade. The deer will munch a bit on young tender plants, but I don't see a whole lot of chewing once the plants gets some height. At the end of the season, I collect the dried seed heads and scatter them in areas where I want vegetation

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(other than bramble and sweet gum), and they pop up the next year no problem. In some areas they may seem "weedy" since they can re-seed like crazy if the conditions are right. But when they do come up in areas I don't want, I just start pulling, since they are easy to yank out. I have also pulled them up, and potted in small containers to get the roots established and then planted where I want.


Tickseed sunflower

Blanket flower

Another lovely, that brings in the pollinators and also re-seeds. With all we have going on in our lives, the plants that can take care of themselves are the ones I love the most. These flowers are so care free and continue to bloom all Summer long. I see a good number of honey bees visiting these flowers along with butterflies. They can get a bit leggy, so sometimes I'll trim them back, but that doesn't stop the blooms.


Honey bee on blanket flower

Passion vine


Bumble bee on passion flower

The intricate design, with its dangling large anthers, curly cued corona filaments, and erect petals makes your jaw drop when you see the passion vine flower. The first time I saw this flower, I really thought it was something from outer space. Actually it would have been the perfect flower to use for an episode of Star Trek especially when the crew beamed down to an alien world.

The flowers attract a whole host of bees and butterflies, but what's really cool, it is also the host plant for the Gulf Fritillary butterfly larvae. These brilliantly orange larvae have huge appetites but for everyone that is fed, the more butterflies will emerge. The vines come back each year with a few more plants scattered nearby. Oh, and I almost forgot, they also produce edible fruit, called Maypops. Once ripe, the flesh around the seeds have a fruity tart taste and wherever you spit them out, a new plant may emerge. The fruit also makes a great jelly or can be used to flavor a spirituous evening cocktail.

Salvias

When I first moved to Georgia, I was adopted by this lovely elderly couple that I just adored. They lived next door to the house I was renting in Athens. I was in graduate school and didn't have a penny to my name. One day, I got into my truck, turned the key and nothing happened. Ray, my lovely neighbor, was in the yard and came over to give me a jump. After several minutes of trying he said, here are my keys, take my truck and I'll see what's up with yours. The keys he handed me were to his 1968, blue and white classic Ford pickup. Dang!! Needless to say, I drove very slow to class.


Black and blue salvia

Both he and his wife Maxine were always so kind and shared so much with me, including plants. One day while I was helping them dig up some gladiolas, we joked that we should start a "plant-a-holics" chapter in Athens. Ray could be president, Maxine, the vice-president and me secretary. Anyway, long story short, they gave me some perennials that I have transplanted from home to home. They passed some years ago, but their plants are still alive and thriving at our farm. The one that I love the most is a black and blue salvia. It loves to spread, but the area I planted it has plenty of room. It wants full sun but will tolerate a little shade. So far the deer have stayed away, but not the pollinators! The dark green leaves accentuate the dark blue flowers; bees and butterflies find this plant irresistible. Other salvias are a bee magnet as well. Again, what I like about these plants is they come back each year, nothing eats them, they seem to be disease resistant since I haven't seen anything and don't need to be babied; a must for every garden.


Honey bee on salvia

Coreopsis:

I know you are getting tired of me saying this but this is another beauty I found in a packet of wildflowers. To be honest, I don't know what the first variety was that I took a liking too, but the ones I love now are


Lanceleav coreopsis

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Lanceleaf and tickseed varieties. They are early bloomers and bring out the bees. Some varieties will die back in the Summer, but no worries, just cut off the tops, toss in an area you want to see more flowers, and wait for cooler weather to bring back the blooms. I just love the sunshine they bring to the garden.

Agastache

Agastache is a newcomer to our farm arriving a few years ago. I actually have several varities now, and trust me, there are plenty out there. But what makes these part of the Proven Winner collection is the length of the bloom time (all Summer) and the number of pollinator visits. The flowers are clusters stuck in spirals that call out to bees, butterflies and hummingbirds. They come in different colors and sizes but the one I've experienced is shorter and compact with purple spikes; another HUGE plus in deer country, since I've seen no munching from those vegetative eating beasts.

There are so many other plants that I love, like butterfly or milk weeds, but just not enough time or pages to talk about them all. There are also a number of weeds that are being added to the list. Maybe next time I will discuss Weeds for Bees and let's not forget Trees for Bees, more favorites for sure. As I'm about to send this article off to Jerry Hayes, our editor, I'm looking out the window watching all the pollinators happily landing from flower to flower; something very calming about seeing these wonderful creatures floating about. I'm lucky to have this view. And in the background, I hear some James Taylor and earlier I heard "Summer Breeze" by Seals and Croft. Ahhh, so much nicer than depressing information we call news.

Agastache

Take care of you and your bees! BC

American Honey Producers Association
www.ahpanet.com

Legislative Report

Eric **Silva**
Legislative Counsel for AHPA
North South Government Services

What a year it has been! As we enter the home stretch of Summer, and ease into Fall, I thought I would take some time to fill you in on what's happening (and not happening) in Washington these days. So here goes.

As you undoubtedly know from the 24 hour news coverage, Congress adjourned without passing an additional phase of COVID relief. The House Democrats had passed a $3 trillion package with a heavy emphasis on funding for state and local governments, front line workers and individuals ($600 federal unemployment insurance extension). The Senate Republicans proposed a $1 trillion package instead that left out most of the state and local funds and added liability protections for businesses trying to operate in the post COVID world. There were a lot of other issues on the table, including $20 billion in additional funds for USDA to help farmers affected by COVID. But the high level pieces of the puzzle ultimately determined whether the whole deal sunk or swam. And it sunk. For now at least. There is some general optimism that the two parties will get back to work in September and put together a middle ground package, but with the presidential election so near it's anybody's guess how the two parties play their hands. Stay tuned for that.

Speaking of USDA funds for COVID relief, AHPA has been in contact with our friends in Congress and at USDA about honey industry challenges. As some of you noted, honey was not included in the original CFAP program, which required a demonstration of at least 5 percent price declines and other significant marketing disruptions to qualify. Unfortunately for the honey industry, all reliable data (according to USDA and the National Honey Board) showed honey prices level or up over the eligible period (January - April). We also surveyed the membership at the time to see what was happening on the ground. While clear that most were concerned about labor shortages, transportation disruptions, and honey price declines, none had yet experienced those on a wide scale. Keeping all of this in mind, COVID is not over and neither are anticipated market disruptions. And so AHPA has made clear to Congress as they consider this next relief package, and to USDA as they consider whether to extend CFAP into Q3 and Q4 losses, that the honey industry may need help. We have been told that both USDA and congressional authors realize that the 5% price decline rule didn't work for all stakeholders and that they are considering alternative metrics going forward, IF there is a program extension. For more detailed information about the CFAP program to date, please go here: **https://www.farmers.gov/cfap**.

The AHPA continues to work on a number of other matters. While there isn't space to cover all of them here, a few highlights follow.

The annual congressional funding cycle is under way and AHPA has been making the case for additional research dollars across the USDA ARS labs. With Senator Hoeven (R-ND) at the helm of the agriculture subcommittee on appropriations, we feel as though we are in good shape And our requests are being heard. Unfortunately, the broader congressional dynamics are such that we may not see a new funding bill this year and instead have to settle for a "continuing resolution". That would maintain existing funding until after the election and possibly 2021. The good news is that bee research funding at ARS is higher than its ever been (particularly with the addition of a Stoneville, MS bee lab), and so even level funding is good for us. But more is certainly needed, particularly in Baton Rouge and Beltsville, and AHPA will continue to work to get those honey bee dollars.

We are also actively preparing a response to APHIS on a proposed release of two biocontrol agents to control Tallow in the southeast. After about two years of back and forth with the agency it seems that they will proceed with public comment period on the releases. Following that comment period, they will decide whether to do additional study, release the bio controls, or deny permits for release altogether. AHPA has been working closely with state beekeepers associations and other stakeholders in Louisiana, Mississippi, Texas, Georgia and Florida to log concerns with APHIS and to engage congressional support. If this issue is of concern to you, please reach out to Joe Sanroma and Steven Coy who are coordinating the response with me in Washington.

Finally, as if AHPA didn't have enough on its plate, our friends at the Xerces Society and some other regionally based interest groups, recently decided to petition the US Forest Service to deny applications for honey bee permits on those lands. In doing so, they cited concerns that honey bees out compete natives. This has been a long time coming in many ways, but filing a formal petition is a significant step and one that warrants a like response. If you rely on Forest Service lands for your bees, please get in touch with us soon to discuss the matter further.

As always, do not hesitate to reach out with questions. Wishing you all a strong honey crop and a safe and healthy Fall ahead! BC

I have a couple of things I use in my yard and thought I would pass them on to the readers of *Bee Culture* that it may come in handy for them to use.

First is a screen to use when moving bees. It gives the bees ventilation, place it over the entrance and screw it on.

My bottom board is cut 24" long, standard are shorter so you can add a spacer to fit.

Here are the dimensions of materials needed.

2 pieces of plywood 3" x 5" = ⅜"
2 pieces cut ¾ by ¾ = 13⅞"
2 pieces cut ¾ by ¾ = 4"
Screen cut to size

Gene
Joplin, MO

Like most beekeepers, I don't throw much away and recycle when possible, I had a bunch of frames that were waxed over and needed to be cleaned up. I also had a soldering iron and the tip fit the slot of the frame. I heated the iron and removed wax rather quickly, then took a small screw driver and finished the job. The heated soldering iron made the job so much easier. Be careful the soldering iron gets really hot. Hope this helps.

Terry
NW Colorado

I am spacing my colonies increasingly further apart, a la Tom Seeley and Darwinian Beekeeping, and fortunately have the space to do it. With more distance to cover, I made a bee cart to go with the mower, based on the metal chassis, axis and wheels of an old spray tank. Everything else is wood.

The cart is compartmentalized, with areas for the smoker, fuel, hive tools, odds and ends like queen cages and markers, and one area big large enough to carry a deep or medium super.

Jeremy

BC

Regeneron Science Talent Search

Mt - Raina Jain

My name is Raina Jain, I go to Greenwich High School and live in Riverside Connecticut. I've had a passion for science as long as I can remember - I emailed National Geographic and NASA as a hopeful 12-year-old with science articles I wrote, for a chance to have them published in their monthly magazines. I got a response stating "Thank you for your interest but we only accept articles from professional writers at this time. Stay curious." Though it may seem small, I tell children that this was the beginning of a long and unforgettable scientific journey.

Every person is a scientist by heart - we all have at one point asked "Why is the sky blue?" or "Why is the moon following me?" I've realized that you don't need to be the smartest or most creative person to be successful in this field. You just need to be curious, which every person already is. For all children reading this, I hope you remember that.

My friend was a semifinalist at the Regeneron Science Talent Search, and after doing some research about this prestigious competition, I was in awe of the amount of opportunity, lasting connections, and tight-knit group of friends the Regeneron STS experience entailed. I applied, and little did I know how much of a life-changing and transformative experience this would be. To be part of such an inquisitive, fearless, and big-thinking group of students who are tackling the most pressing problems was simply an honor. Although all the finalists explored different realms of science - we are united by our passion to use science as a tool and make the world a better place.

1. Why the focus on Honey Bees? Are you a beekeeper or know a beekeeper and have heard about our 4 P's: pest, parasite, pathogen and poor nutrition challenges?

   a. My family friend has a bee farm and she kept telling me about the issue of *Varroa* mites. I only realized the extent to what she meant when I visited her bee farm first hand, and was in complete shock to see hundreds of hives completely empty. I've been raised with the principles of live and let live - to value each life no matter how small. Seeing these tiny yet fascinating creatures being affected so greatly with little defense was what propelled me to create an effective, safe, and affordable treatment for *Varroa* mite infestations in honey beehives. Bees have become a hobby of mine - a passion fostered by this science project itself.

   b. I have heard about the 4 Ps – I think it's a great way to simply sum up what we now know are the greatest threats to the honey bee population worldwide. It is important to educate people, especially our youth about active steps they can take to help save the bees.

2. How did you find out about Varroa mites and the incomplete control of them in honey bee colonies?

   a. I was a finalist at the 2018 National Junior Science and Humanities Symposium (JSHS) and Dr. Samuel Ramsey, a famous entomologist who discovered the *Varroa* mites feed on the fat body of bees as opposed to the blood, was the keynote speaker. It was one of the most eye-opening and engaging presentations I've ever attended. After leaving the science fair inspired, I invited him to my laboratory where we discussed potential solutions to rid of mite infestations. His presentation was what allowed for the conception of a dual-function entranceway. Since his presentation in 2018, we have been staying in touch and he has been an instrumental figure in my journey with saving the bees.

3. What research led you to be able to ID a chemical *Varroa* control option? Why Thymol?

   a. After doing research on varroacides, I considered many potential substances. The reason I chose thymol was not only was it the most natural substance (bees pollinate the thymus-derived plant itself) but there was a great difference in the lethal concentration (LC50) between the *Varroa* mite and the honey bee that I knew I could take advantage of. The LC50 for a *Varroa* mite was 56µg, whereas the LC50 for the honey bee was 250µg. I realized that if I could deposit thymol content slightly above the 56µg limit but much lower than the 250µg, I could create a viable solution to guaranteeing the death of the parasite but simultaneously leaving the honey bee unharmed – which is exactly the case in my research.

   b. I decided to deliver the thymol in an entranceway form. I realized that not only would this method be consistent in delivering the same dose of thymol per bee, but the gaseous release would also combat idle mites inside the hive. One of the most commonly used methods of controlling mite populations, Apiguard, is temperature dependent, cannot be used during the honey-flow period, and inhibits the flight ability of the bee. I wanted to create a device that has no adverse effects on the honey bee and does not need to

be removed regardless of the state of the hive. I found the most effective way to achieve this was through an entranceway to the beehive itself.

4. I am sure you know that Bayer had a similar product on the market. Have you spoken to them?

   a. Bayer has been working on a similar product. The "*Varroa gate*" – the prototype they've been researching for the past eight years – uses the pesticides coumaphos and flumethrin (both of which have been developed in Bayer laboratories). There was an article published in *Nature* recently – a widely recognized scientific journal – about coumaphos's effects on honey bees. The article centered on how coumaphos was highly toxic to bees and studies found traces of this pesticide in 98% of wax samples. Coumaphos is a very under-studied treatment and there is much more research needed to determine the adverse effects on the health of the honey bee and the environment. In my research, I found thymol was a much safer and effective approach as it is a natural plant that bees pollinate themselves.

5. Since *Varroa* is typically concentrated on young 'Nurse Bees' in the brood nest area of a honey bee colony how does your delivery device lower *Varroa* levels if it is only targeting older forager bees coming and going from the hive entrance?

   a. The entranceway is dual-function, meaning that in addition to the physical deposition of thymol as the bees pass through the entranceway, there is also gaseous release of thymol in the hive, combatting the mites present on the non-foraging bees. The thymol is embedded in hydromed – a substance which embeds the thymol in a hard gel and allows for the controlled release of thymol (both in physical and gaseous form). Due to this controlled-release, the dual-function entranceway is temperature independent, does not contaminate the honey or larvae, and just requires a one-time installation with no additional maintenance.

6. What *Varroa* mite sampling procedure was used to ascertain *Varroa* population numbers per 100 bees. Did you use the Honey Bee Health Coalition (HBHC) , *'Tools for Varroa Management Guide'* for that metric?

   a. Being an inexperienced beekeeper before the start of my project, I was using the screen methods to count mites. After reading the *Honey Bee Health Coalition (HBHC), 'Tools for Varroa Management Guide'*, I quickly realized that the alcohol wash and sugar roll methods account for far less variability. I am not a fan and have never recommended the alcohol wash simply because the bees die. I believe in the principle of live and let live – to value each life no matter how small. I advised my volunteers to use the sugar roll method to determine *Varroa* mite populations with the installation of the entranceway every week for eight weeks.

7. What is the next step in how you help Beekeepers with this product?

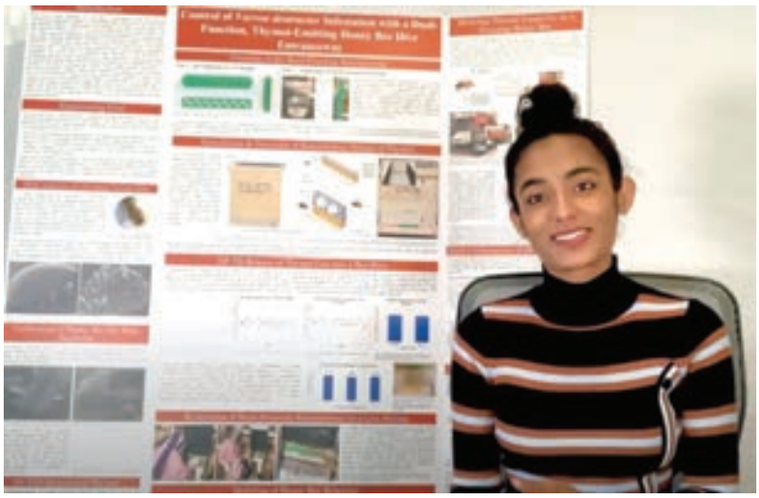
   a. I am currently in contact with a bee farm that has over 30,000 beehives in California in which I will be testing my device on. Although this was supposed to take place in the Summer, my laboratory closed down due to the Covid-19 pandemic and it has now been postponed to the Fall. I have also obtained a U.S. patent. Once the patent is completed and I receive mass data from the bee farm in California, I look forward to distributing this device to beekeepers on a larger scale.

8. How can Beekeepers help you?

   a. Throughout my journey with bees, I've noticed beekeepers love and respect for these fascinating creatures with a united common goal to save the bees. If you have a significant amount of hives and would like to test this product, please reach out to me so I can expedite the process to get this entranceway out to beekeepers everywhere. **raina.jain55@gmail.com**

BC

Scan this code to view Raina's Regeneron Science Talent Search Presentation



A Closer Look

The Greater Wax Moth

Clarence **Collison**

The greater wax moth, *Galleria mellonella Linnaeus*, is a ubiquitous pest of the honey bee. The moth is widely distributed throughout the world, causing serious problems in temperate, tropical and subtropical beekeeping regions, where the warm temperatures favor the rapid development of the moth (Spangler 1989). Combs are most often destroyed by the wax moth when stored in dark, warm and poorly ventilated areas. However, there can be considerable damage in combs even while in use, especially in hives where the population of adult bees is too small to protect all of the combs (Shimanuki 1980). The wax moth larvae burrow into the edge of unsealed cells with pollen, bee brood, and honey through to the midrib of the honey bee comb. Burrowing larvae leave behind masses of frass and webs (Kwadha et al. 2017).

"The behavior of adult greater wax moths was observed throughout the year in apiaries of *Apis mellifera L.* Generally, eclosion (emergence of an adult) occurred in the evening and moths left the hive to expand their wings even if bees were not present. Soon after dark, the moths flew into trees, and the males were seldom observed again. Females that tried to enter a hive in the early evening were chased by the bees, but approximately two hours after dark, the bees were no longer aggressive. Oviposition in hives started approximately 24 hours after eclosion and continued for four nights. Each morning the moths left the hives shortly before daylight and flew into trees. Females generally visited strong bee colonies and not decoy hives containing comb or weak colonies. Mated female moths seemed to be attracted to some hives and completely avoided others. In Winter when the temperature was 21°C (69.8°F) or lower, adults stayed in the hives that contained brood (Nielsen and Brister 1977)."

In colder climates, the greater wax moth overwinters as a pupa. In warmer areas, adults emerge all year. The adult female is about ¾ inch long and 1 to 1¼ inches wide from wingtip to wingtip. Within four to 10 days after emergence, the female begins to lay eggs on combs or in cracks between the wooden parts of the hives (Shimanuki 1980). In most cases, greater wax moth females oviposit in clumps of 50-150 eggs (Williams 1997). She lays about 300 eggs in her lifetime, which usually is somewhat less than three weeks. After egg hatch, the larvae feed on the wax combs, obtain nourishment from the cast off honey bee pupal skins, pollen and other impurities found in the combs. For this reason, darkened combs are more likely to be infested than light combs or foundation (Shimanuki 1980).

"Greater wax moth eggs are pearly white to light pink in color and have a rough texture due to wavy lines running diagonally at regular intervals (Ellis et al. 2013). Throughout development, the egg changes from white to a yellowish color. At approximately four days prior to hatching, the greater wax moth larva is visible as a dark ring within the egg. Twelve hours prior to hatching, the fully formed larva is visible through the egg chorion (Paddock 1918). According to Williams (1997), greater wax moth eggs develop quickly at warm temperatures (29-35°C; 84.2-95°F) and more slowly by about 30 days at cold temperatures (18°C; 64.4°F). Eggs will not survive in extreme cold (at or below 0°C; 32°F for 4.5 hours) or extreme heat (at or above 46°C; 114.8°F for 70 minutes)."

"Sohail et al. (2020) used standard protocols to determine how greater wax moth larva consumption of wax comb impacts various food utilization and larval growth parameters. Five larval instars (3rd, 4th, 5th, 6th and 7th) were assessed 24 hours after molting from the prior instar stage and 48 hours before molting to the next instar stage. The consumption rate (CR) of wax was lowest for 3rd instar larvae (17.5 ± 0.8 mg consumed/day, mean ± s.e.) and highest for 7th instar larvae (515.4 ± 22.7 mg/day). The relative growth rate (RGR) was lowest for 7th instar larvae (0.05 ± 0.01 mg/day) and highest in 3rd instar larvae (0.16 ± 0.04 mg/day). A similar trend (decrease in response with increase in larval age) was observed for conversion efficiency of ingested food (ECI), conversion efficiency of digested food (ECD), and approximate digestibility (AD). Third instar larvae had significantly higher ECIs, ECDs, and ADs than did all other larval instars."

"Sohail et al. (2017) determined the seasonal abundance (No. moth larvae/hive) of *G. mellonela* larvae in hives of honey bees located in district Sargodha, Punjab, Pakistan. Their data showed that the maximum moth abundance occurred during the regional dearth period, i.e. May-November. The peak abundance (14.8 ± 3.9 moth larvae/hive) occurred in August. A multiple correlation analysis was used to estimate the association between explanatory variables (multiple weather factors) and the abundance of wax moth larvae in hives, and a stepwise

regression analysis was used to find the best explanatory variable for high abundance. All abiotic factors were correlated with the seasonal abundance of greater wax moth larvae but minimum and maximum temperature correlated with moth abundance more than did any other variable tested."

"Greater wax moth larval behavior was observed in apiaries and in the laboratory. The first instars fed on honey, and then dispersed within colonies where they infested brood combs, primarily in areas of unsealed brood or pollen. Larvae tunneled into cell walls until bees capped their brood, and then fed in the capped cells. After the bees emerged, worker bees captured moth larvae as cells were cleaned and repaired. Small captured larvae were eaten by bees; larvae that escaped capture until late instars were removed from the colony. Bees tried to sting large larvae, but larvae were resistant to penetration of the sting (Nielsen and Brister 1979)."

"Mature greater wax moth larvae are capable of boring into wood and often make boat-shaped indentations in the woodenware of the hive body or frames. After finding a place in the hive to pupate, the larva begins spinning silk threads that will become the cocoon which they attach to the excavated indentations (Paddock 1918). One often finds many of the cocoons congregated in areas around the perimeter of the bee nest in high infestations (Ellis et al. 2013)." The pupal development stage varies with season and temperature from six to 55 days (Williams 1997).

"Mohamed et al. (2014) investigated the effects of five natural diet materials on the developmental biology and mortality of all life stages of the greater wax moth in the laboratory. Effect of all five natural diets on the developmental biology and mortality varied significantly. New wax comb (NW) was found to be the poorest larval diet inducing prolonged immature stage duration, shortening adult moth longevity, decreasing egg productivity, retarding oviposition, prolonging the entire life-cycle duration and causing significantly higher overall life stage mortality. In contrast, feeding larvae on diets of old wax comb (OW), old wax comb containing 10% w/w added pollen (OWP), new wax comb containing 10% w/w added pollen (NWP), and bee collected pollen (BP), positively affected the development and vitality of all life stages."

"While strong and vigorous colonies do not usually suffer severe damages, there are two critical periods during the year when damage caused by larval activity is often severe. The first period is mid to late Spring when colonies weakened by the stress of Winter are susceptible to moth depredations. The second period is late Summer and Fall, particularly when colonies have been robbed too closely after the Spring honey flow. Insufficient stores, lack of nectar flow, dwindling, and other factors which contribute to a weakening of the colony render it susceptible to wax moth attack (Warren and Huddleston 1962)."

"Colonies of honey bees in Brazil, the United States and Venezuela were presented with adult greater wax moths at their hive entrances. Africanized colonies were quicker, more persistent, and more intense in their attacks than were European colonies. Both races attacked female moths in preference to males. Although colony size did not appear to be related to defensiveness, attack data were correlated with the numbers of bees guarding the entrance. Africanized colonies had significantly more guard bees. During successive trials, both races attacked the moths in significantly shorter times. These findings may help explain the unexpectedly low population levels of *G. mellonella* in some areas of South America (Eischen et al. 1986)."

"Zhu et al. (2016) proceeded to determine the optimal cryopreservation method for eradication of the greater wax moth from honey bee comb. To pursue this goal, mortality rates of *Galleria mellonella* eggs, larvae, pupae and adults were studied after treatment at -15 or -20°C (5°F, -4°F) for varying durations. The results showed that larvae, pupae and adults all died after they were treated for one hour at either -15 or -20°C. Moth eggs, on the other hand, had strong frost resistance. It was only when the treatment time increased to 10 hours that all eggs were killed. Freeze tolerance of seven-day-old eggs was higher than that of one, three, and five-day-old eggs."

Exposure of beekeeping equipment to temperatures above or below the range tolerated by greater wax moth is a safe, relatively rapid method of eliminating or preventing infestations. Temperature manipulation eliminates the hazard of contaminating bee products with chemical residues (Williams 1997).

"Greek honey was monitored during a three-year surveillance program for residues of chemicals used to protect honey-bee combs from wax-moth. A total of 115 samples purchased from stores (commercial samples) and 1060 samples collected from beekeepers (bulk samples) were analyzed for 1,4-dichlorobenzene (p-DCB), 1,2-dibromoethane (DBE) and naphthalene. A purge & trap-gas chromatograph-mass spectrometer system was used for the analysis. During the first year of the study, 82.9% of the commercial samples had residues of p-DCB that exceeded the established limit of 10 µg/kg, whilst during the second year 53.6% and during the third 30% exceeded the limit. The percentage of beekeeper's samples that had more than 10 µg/kg decreased from 46.6% to 34.7% and 39.8% respectively during the three consecutive years of analysis. Only one commercial sample (0.8%) had residues of DBE that exceeded 10 µg/kg during the three years study, while 9.9% of the beekeeper's samples exceeded this limit in 2003. This percentage fell to 1.9 and 2.8% during the following years. Naphthalene was found in more commercial samples than in samples from

beekeepers during the first year, but decreased to similar levels during the next two years. Honeys that are produced earlier in the season are more contaminated than those produced later (Tananaki et al. 2006)."

"Bee propolis is a sticky amalgamation of plant resins collected by honey bees and used in the hive for filling cracks and repairing combs. Propolis contains a diversity of compounds of plant origin, and is reported to have medicinal, antimicrobial, insecticidal, and phytotoxic properties. Johnson et al. (1994) examined the physical and chemical composition of North American samples of bee propolis from several sites in North America and tested for bioactivity against larvae of the greater wax moth, a common apiary pest. The amount of methanol-extractable resin in samples from Ohio and Georgia ranged from 24% to 79% by weight. Propolis collected from hives in Ohio was more chemically diverse (over 30 compounds detected by paper chromatography) than material from South Georgia (fewer than 10 major compounds) and contained a lower proportion of methanol-insoluble beeswax. The paper chromatographic surveys revealed little variation in the chemical profile of specific hives over a six-month period and no differences between propolis from adjacent hives. Four flavonoids were identified from propolis collected in Ohio: kaempferol, galangin, 3,3'-dimethoxyquercetin and 3-methoxykaempferol. When mixed into artificial diet, fractionated propolis reduced larval growth of the greater wax moth, but not dramatically. An array of phenolics reported from propolis (caffeic acid, chrysin, ferulic acid, galangin, kaempferol and quercetin) were bioassayed individually for effects on larvae, but none reduced larval growth at the concentrations tested, suggesting that wax moths are tolerant of some phenolics in their diet."

"Although the greater wax moth is often reported to infest weak honey bee colonies that are exposed to pesticides and diseases, it is also a threat for healthy colonies. Therefore, there is a fairly high probability of transmission of both microflora-specific bacteria and pathogen microorganisms, especially *Nosema* species, between these organisms (moth and bees). Ozgor et al. (2017) investigated the presence of *Nosema* species in greater wax moth collected from apiaries as well as grown in laboratory conditions. Adults and late instar larva of wax moth were used for detecting *Nosema* apis and *Nosema ceranae*. Real-time PCR amplification studies were performed and specific ITS regions were targeted to distinguish *Nosema* species. Real-time PCR results showed that *N.* apis and *N. ceranae* were found in both stages of *G. mellonella*. This is the first study to confirm that *N.* apis and *N. ceranae* are present in greater wax moth collected from apiaries and grown at laboratories in Turkey." BC

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Telling The Bees

Elsie **Czyzowska**

Margaret Warner Morley, in her 1899 *The Honey-Makers*, describes the occurrence of 'telling the bees' through a number of anecdotal stories. One such tale is that of an Oxfordshire woman who failed to inform seventeen hives of bees that her grandfather, their keeper, had died. Morley writes that 'because no one told them of his demise, every bee died'[1]. This demonstrates the importance of 'telling the bees', a phrase which rose from the belief that if bees were not told of family tragedy, further calamity would occur. Further loss usually took the form of the bees leaving, dying, or failing to produce a viable quantity of honey. Given the calamity which has occurred in 2020, the history of this phrase, and how it serves a larger emotional purpose, is now perfect poised to be explored against the present day. What have we learned from talking to our bees, and what do we seem to have forgotten?

The tradition of 'telling the bees' may come from a number of directions, though Celtic mythology is the most popular root. The Celts believed that bees were able to carry messages from the living to the dead, which itself can be traced as far back as ancient Egypt, where honey was used in rites for the dead[2]. In Christian mythology, this journey 'developed from the bee moving between realms to stories that it came directly from Paradise'[3], a sweet image for any bee-lover. Peter Stanford suggests that, with bees as 'traditional symbols of fertility', they must be told of loss or else they 'instinctively flee death'[4]. In telling the bees about tragedy before it hits them, the beekeeper is acting as protector, but only to an extent, for what they are truly protecting is their livelihood. The phrase 'telling the bees' then, through its basis in folklore and mythology, begins to question the freedom against the constraints of farmed hives, and through this, reveals the co-dependent relationship which we as humans hold with the natural world.

Aside from mythology, there is logic to 'telling the bees', primarily the many studies proving the intelligence of the insect. In January 2019, Wataru Toyokawa published an article for *The Conversation* detailing what humans can learn from the 'collective intelligence' of honey bees. In particular, he highlights their avoidance of 'maladaptive herding', that is, preventing 'bad information from being viral' amongst a herd or group – human communities falling victim to group hysteria, for example[5]. Additionally, a year before this article, in June 2018, a study published by *Science* Journal reported that 'honey bees can learn and apply the concept of greater than and less than to interpret a blank stimulus as representing the conceptual concept of zero'[6], implying that when a hive deigns to stay with their keeper, they see their life with a keeper as 'greater than' a life without one. The 2019 documentary *Honeyland* provides an example of this intelligence, showing what happens when the keeper is worth 'less than' freedom. Following the life of isolated beekeeper Hatidze in rural Macedonia, caring both for her mother and for her bees, the film documents the arrival of the nomadic Sam family to her empty village. Hatidze maintains a loving, dear relationship with her bees, and can be seen on numerous occasions throughout the film humming or singing to her bees. Often, she repeats the phrase 'Half for me, half for you', particularly significant in terms of 'telling the bees'. It is as though Hatidze is constantly preparing her bees for her intrusion into their hives; an acknowledgment that though she may treat the bees with dignity and respect, she is still profiting from their labour.

As *Honeyland* progresses, the father of the Sam family, Hussein, decides to take up beekeeping, and Hatidze teaches him her traditional methods, highlight especially her 'Half for me, half for you' philosophy. However, Sam does not listen, and when his own bees deplete from his selfish rearing, he destroys a number of Hatidze's hives in search for more honey. Sam actively brings tragedy to his and Hatidze's bees, he does not tell them to prepare, because their preparation will be his loss. This is a larger message for consumerism, and the selfish way in which we treat the world, and so it seems as though when humans forget to stop and tell the bees that things will get better, they also forget that they have an obligation to act for the better in themselves.

Humans tell animals more than just loss – when we talk to our pets, insignificant observations about the day blend together with emotional revelations, and this was often the same for keepers and their bees. In Westphalia, Morley writes about bees being told happy news as well as tragedy, the most common example of this being weddings in the family, where 'the newly-married couple going to their new home must introduce themselves to the bee, or else their married life will be unfortunate'[7]. 'Telling the bees' could even see the hives 'decorated' for a wedding, with

1 *Margaret Warner Morley, The Honey-Makers (Chicago: A.C. McClurg Company, 1899), p.340*
2 Hilda M. Ransome, The Sacred Bee in Ancient Times and Folklore (New York: Dover Publicatinos, 2004), p.29
3 Mark Norman, Telling the Bees and Other Customs: The Folklore of Rural Crafts (Cheltenham: The History Press, 2020), p. 73
4 Peter Stanford, How to Read a Graveyard: Journeys in the Company of the Dead (London: Bloomsbury, 2013), p.164
5 Wataru Toyokawa, 'What smart bees can teach humans about collective intelligence', The Conversation (January 29, 2019), Accessed: 12/08/2020, Accessed From: https://theconversation.com/what-smart-bees-can-teach-humans-about-collective-intelligence-110656
6 Scarlett R. Howard et al, 'Numerical Ordering of Zero in Honey Bees', Science Journal, 360:6393, pp.1124-1126 (June 8 2018), p.1125
7 Margaret Warner Morley, The Honey-Makers (Chicago: A.C. McClurg Company, 1899), p.342

Figure 1: Still of Hatidze Muratova from the 2019 documentary Honeyland, Directed by Tamara Kotevska and Ljubomir Stefanov. There are a number of beautiful images from this documentary available from Google Images.

'pieces of cake left outside so that the bees too could partake in the festivities'[8]. In telling the animals we surround ourselves with pieces of our lives, we trust that our dogs, cats, our bees, all want to be a part of our stories. This is largely because humans have an anthropomorphic desire for things to be 'relatable': for a fox to be 'cunning', a family dog to be 'empathetic', and for bees to be 'full of wisdom'[9].

Talking to animals, in particular our pets, is scientifically proven to aid general wellbeing. They encourage an active lifestyle, because they largely depend on us to provide one for themselves. As well as this, 'compared with non-owners, pet owners living alone had significant higher morale on four of the six psychological scales, including absence of agitation, optimism, surgency, [and] absence of loneliness'[10]. They key factor here is *optimism*. Feeding into research on the 'Laws of Manifestation' and 'The Power of Positive Thinking'[11], to talk to your pet about your highs and lows replicates talking to a person, and grants companionship through difficult times. This companionship is almost always reduced to dogs or cats in studies, but why shouldn't 'telling the bees' yield the same result? It seems as though the only difference between adopting a rescue cat and building a bee hotel for solitary bees is the size of the animal you are talking to.

Figure 2: Charles Napier Hemy's painting, The Widow, depicting the act of 'telling the bees', 1895. ***https://images.fineartamerica.com/images/artworkimages/medium-large/1/the-widow-charles-napier-hemy.jpg***

Sylvia Plath ended her second book of poetry, *Ariel*, with five 'bee poems', and one of these, 'Wintering', includes the following lines:

This is the time of hanging on for the bees the bees
So slow I hardly know them,
Filing like soldiers
To the syrup tin
To make up for the honey I've taken.[12]

In this line, 'hanging on for the bees the bees', Plath represents the same idea as talking to your dog or your cat: that in having a creature which depends upon you, and in forming an emotional connection, you feel a sense of optimism in 'hanging on' for their sake. In 'telling the bees' of deaths in the family, you ask them to stay, and therefore you promise both the bees and yourself that this death will not be 'greater than' the possibility of your shared future. As the rhyme recorded by Morley sings to the bees, 'The master's dead, but don't you go; Your mistress will be a good mistress to you'[13].

The history of 'telling the bees' ultimately appears as a selfish representation of our larger relationship with nature. That we talk to them to reassure ourselves, or from the folklore and fear that if we don't, they will abandon us. This is the same selfishness which takes over the treatment of bees by 'non-keepers'; their depletion around the world symbolises that we as a collective do not care to help them, despite our current existence being contingent on theirs. As Toyokawa summarised, 'there is so much we can learn from the humble bee'[14]. But perhaps 'telling the bees' does not have to be selfish. Perhaps, in 'telling the bees' about the events which carry our lives, humans fall back into something more instinctive, something from the past life, where bees were synonymous with fertility and wisdom, and where we treasured the honey that they produced in a way commercialism has seemingly robbed us. It seems as though in the present day, with so many people isolated and lonely, our relationship with bees can provide optimism with a hint of magical realism, believing in the powerful myths of these tiny, Heavenly creatures. It seems as though with all the struggles people have to share, telling a bee about it could only serve to help. BC

Figure 3: 'The Bee Friend' by Hans Thoma, 1863/64, ***https://commons.wikimedia.org/wiki/File:Hans_Thoma_11.jpg***

8 Kaushik Patowary, 'The Adorable Custom of 'Telling the Bees'', Amusing Planet (2019), Accessed: 12/08/2020, Accessed From: https://www.amusingplanet.com/2019/04/the-adorable-custom-of-telling-bees.html

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11 For example: https://thelawofattraction.org/positive-thinking-and-the-law-of-attraction/

12 Sylvia Plath, 'Wintering', October 1962

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All The Buzzzz in...

Beekeeper's Lab by Kim Lehman

This book is full of 52 family friendly activities from around and about the hive including art projects, recipes, experiments, garden activities, and more. Author Kim Lehman is the columnist and creator of the Bee Kid's Corner. Enjoy one of the activities from the book. To order a copy of the book go to beeculture.com or www.quartoknows.com.

LAB 20

WAXED-THREAD ORNAMENTS

YOU WILL NEED

- newsprint or cardboard
- beeswax
- double boiler or slow cooker
- scissors
- embroidery thread
- wax paper
- thick marker

Creating ornaments with waxed thread will keep the entire family engaged. The design possibilities are endless. No need for glue, tape, or staples—the wax sticks to itself.

BEE BUZZ

Wax is a clear liquid when secreted from the eight wax glands in a worker bee's abdomen, but it later solidifies into white scales. On average, it takes 800,000 wax scales to produce 1 pound (454 g) of beeswax.

SAFETY NOTE

Keep wax away from open flames. Unplug heating source when not in use.

DIRECTIONS

1. Set up a workstation with newsprint or cardboard to protect your work surface. Melt the beeswax in a double boiler or slow cooker.

2. Cut a skein of embroidery thread into pieces about 2' (60 cm) long.

3. Dip each strand of thread into the melted beeswax. Lay each waxed strand flat on wax paper to allow it to harden. (Fig. 1)

4. Twist two waxed strands together by twirling them between your fingers on one hand while holding the strand stationary with the other. The stickiness of the wax will bind the twisted strands together. (Fig. 2)

... Bee kid's corner

Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
October 2020

Beeswax!

One pound of beeswax will make 35,000 wax cells.

Bees need to eat between 7 and 9 pounds of honey in order to produce 1 pound of beeswax.

Hundreds of honey bees will contribute to the construction of a single cell of the comb.

Fig. 1: *Dip each strand of embroidery thread into melted wax.*

Fig. 2: *Twist two waxed strands of embroidery thread together.*

Fig. 3: *Make five ovals by using a thick marker as a spacer. Twist the strand together to hold in place.*

5. You will need five evenly sized loops to make this particular waxed thread ornament. Bend a twisted strand in half. Make the first loop by placing the marker in the fold. Twist the strands together with a half turn around the marker. Continue making a total of five loops along the strand using the marker as a spacer. (Fig. 3)

6. Bend the strand into a wreath shape. Attach the two ends by threading the loose end of thread through the end of the loop. (Fig. 4)

7. Make a ring to hang the ornament by looping one thread end at the top and then wrapping with another piece of thread at the base to secure. Carefully clip all thread ends. (Fig. 5)

8. Coat the ornament by dipping it into the melted wax as many times as desired.

Fig. 4: *Thread the end strands through the last loop to complete the circle.*

Fig. 5: *Bend and wrap the strands around the top to make a loop for hanging the ornament.*

TAKE IT FURTHER

What other shapes and patterns can you create using waxed thread?

FUN FOR KIDS

Play with a few different colored waxed threads to create a two- or three-dimensional sculpture.

BEE VET

Biosecurity For Beekeepers

Dr. Tracy **Farone**

It seems there has never been a time when there has been a greater public and mass media focus on disease and sanitation. Any farm kids out there ever play "king of the mountain" on a manure pile with your cousins? I did. We didn't worry about "germs" or "bugs". When pursuing a career in studying biology, diseases, and public health, however, one comes to realize that potential infectious agents are all around us – normally. Most microorganisms are beneficial to us, but some can be pathogenic. Honey bees certainly are not immune to pathogenic and environmental outside threats. Applying biosecurity principles is one tool in the beekeeper's box that should be evaluated and employed whenever possible to prevent, reduce, and/or control biosecurity threats.

What is biosecurity for beekeepers?

Biosecurity is a set of protective protocols utilized to prevent disease, chemical, physical, and other health threats in animals and/or humans. These protocols are designed to prevent these threats from entering a population and/or the spread of disease from one population to another. Agricultural and veterinary biosecurity principles have been developed and are routine for just about every agricultural animal in the U.S. In animal health, biosecurity protocols are designed to avoid significant economic losses should a threat arise.

Considerations in biosecurity

Biosecurity is considered an integral part of beekeeping in many places in the world. Australia, New Zealand, much of Europe, and Canada all have detailed recommendations and resources for employing biosecurity in their apiaries. In the US, we have room to work and improve on this. Veterinarians are extensively trained in the principals and tactics of biosecurity, which can be applied in a variety of situations.

How beekeepers may utilize biosecurity:

First, I would like to make the disclaimer that this information is **not** intended for non-migratory beekeepers. While certainly some of these principals could be and are applied, biosecurity is quite different for millions of hives of flying animals moving all over the country verses a stationary yard. (Perhaps another article for another time or – another life. ☺)

Also, keep in mind that **no single biosecurity plan will be practical for every beekeeping situation**. However, applying as many best practices as possible to your apiary/ies can reduce risks and improve your bees' health and productivity. Some plan is better than no plan.

Ten biosecurity points to evaluate in your bee yard/s:

1. **Assessment and Awareness:** Do regular hive inspections. I have talked with beekeepers who are afraid to open their hives and/or do not know what they are looking for. If that is you-stop and take some time to get comfortable. Be brave. "But what if I kill the queen?", you may ask. Well, if you do, learn how to fix it (having more than one hive helps). Learn bee biology like the back of your hand. Take beekeeping classes, find a mentor beekeeper and/or veterinarian who can help you.

I often tell my pre-med students that one must learn what normal is before knowing what abnormal is – beekeepers must do the same. The only way to do this is to open the hive and look. During active seasons like Spring, this may mean going into your hive/s weekly. If you do not, you will miss a lot, without even knowing it, especially swarms.

After you are comfortable with normal, be aware of possible threats (from bears to brood diseases) that could come into your yard, what they look like, and ways you could prevent them. In biosecurity speak, this is called "Hazard Identification" and "Risk Evaluation and Management". Early identification of an issue will facilitate proper intervention and/or the prevention of disease spread.

2. **Bees**: For most livestock, the introduction of new animal/s into the herd or flock is undertaken with great biosecurity precautions, as this is a major way threats can enter the operation. Purchase bees or queens from a known and trusted source. Try rearing your own bees and queens. If your bees are doing well, utilize your own stock. Once you get comfortable doing more hive inspections, you may be amazed how many split opportunities arise.

If you manage multiple yards, keeping bees at different locations separated by three to five miles is a good practice, whenever possible. Not "keeping all your bees in one basket" could be critical in limiting losses should a disease outbreak or other threat arise.

3. **Equipment:** Consider the tools and equipment utilized in your beeyard. Try to develop an "all in, no out" policy for every yard. Simply having a dedicated hive tool per yard can reduce the spread of disease. Do not obtain used hive equipment, frames, tools, or wax from outside sources. All of these can harbor diseases and pests. Wax frames should be rotated out of use every three years to avoid disease transmission and pesticide exposure. Be aware that vehicles can bring pathogens and

pests into a yard. Biosecurity recommendations include parking vehicles away from hives whenever possible and cleaning vehicles regularly.

Frame marked with year to facilitate aging of frames

4. **Sanitation/disposal:** Regular cleaning is essential for all hive equipment and tools. Ideally any wax, honey, brood, dead bees, or propolis should not be thrown on the ground but collected or disposed of away from bee access. Honey spills should be cleaned to avoid robbing behavior. Old, unusable equipment should not be lying around, but be disposed of and ideally, burned.

Bees on a dollop of wax and honey

5. **Records:** Keeping records of your hive inspections, incoming bees/products/equipment, mite treatment, etc. is vital to tracking the health of your colonies. Some good record references are included below.

6. **Personnel:** People, their clothing (veils, gloves), and shoes can bring pathogens into your yard. Have visitor policies on sanitation. After all, it is your place. Ideally, in healthy yards, hand washing, or changing of gloves should be done at least between yards. Veils/jackets should be laundered regularly. If possible, set up a boot scrub area before and after entering a yard.

7. **Health practices:** Develop a regular health plan for your bees. This includes regular hive maintenance and inspections, disease monitoring (ex. routine mite counts), using medication applications properly, and an appropriate nutritional plan. This plan should correspond to the seasonal needs of the bees. Do not feed outside honey to your bees, as honey can harbor diseases, including American Foulbrood spores. Be sure to keep vectors of disease, like rodents, in check with mouse guards.

8. **Plan in sickness and in health:** Good biosecurity ideally is meant to prevent diseases from coming into a bee yard. However, biosecurity can also prevent diseases from coming out. If an infectious disease is identified in your yard, biosecurity measures will need to be increased. Proper disposable gloves use between hives may be employed to prevent disease spread. Sick hives should be inspected last. Sick hives may need to be quarantined or euthanized. Use a dedicated hive tool or thoroughly disinfect your hive tool after use in a sick hive. Please note that an alcohol flush **will not** sterilize a hive tool. Carefully disinfecting a hive tool in a hot smoker is a good field method to reduce pathogen spread.

9. **Know how to get help:** If you suspect an infectious disease in your apiary, call for help. Know the bee laws in your state and contact your local bee inspector for assistance. Establish a relationship with a veterinarian.

10. **Continue learning:** Below are a list of resources and links that discuss bee biosecurity recommendations in greater detail. You do not have to become a biosecurity expert overnight, but practically employing these principles will reduce health risks to your bees and other bees in your community. Fall/Winter clean-up is an excellent time for assessment of your goals for next season. BC

https://beeaware.org.au/biosecurity/

Biosecurity Manual for Beekeepers: Reducing the Risk of Exotic and Established Pests Affecting Honey Bees. Plant Health Australia, 2018. **https://beeaware.org.au/wp-content/uploads/2019/05/Biosecurity-Manual-for-Beekeepers.pdf** -great Australian based resource on specific diseases for beekeepers and veterinarians.

Government of Canada, Canadian Food Inspection Agency, and Office of Animal Biosecurity. *Section 2: Operations Management - National Bee Farm-Level Biosecurity Standard* -7 May 2013, **www.inspection.gc.ca/animal-health/terrestrial-animals/biosecurity/standards-and-principles/bee-industry/eng/1365794112591/1365794221593?chap=5#s19c5**.

https://www.inspection.gc.ca/animal-health/terrestrial-animals/biosecurity/standards-and-principles/honey-bee-producer-guide/eng/1378390483360/1378390541968?chap=10 -a biosecurity checklist.

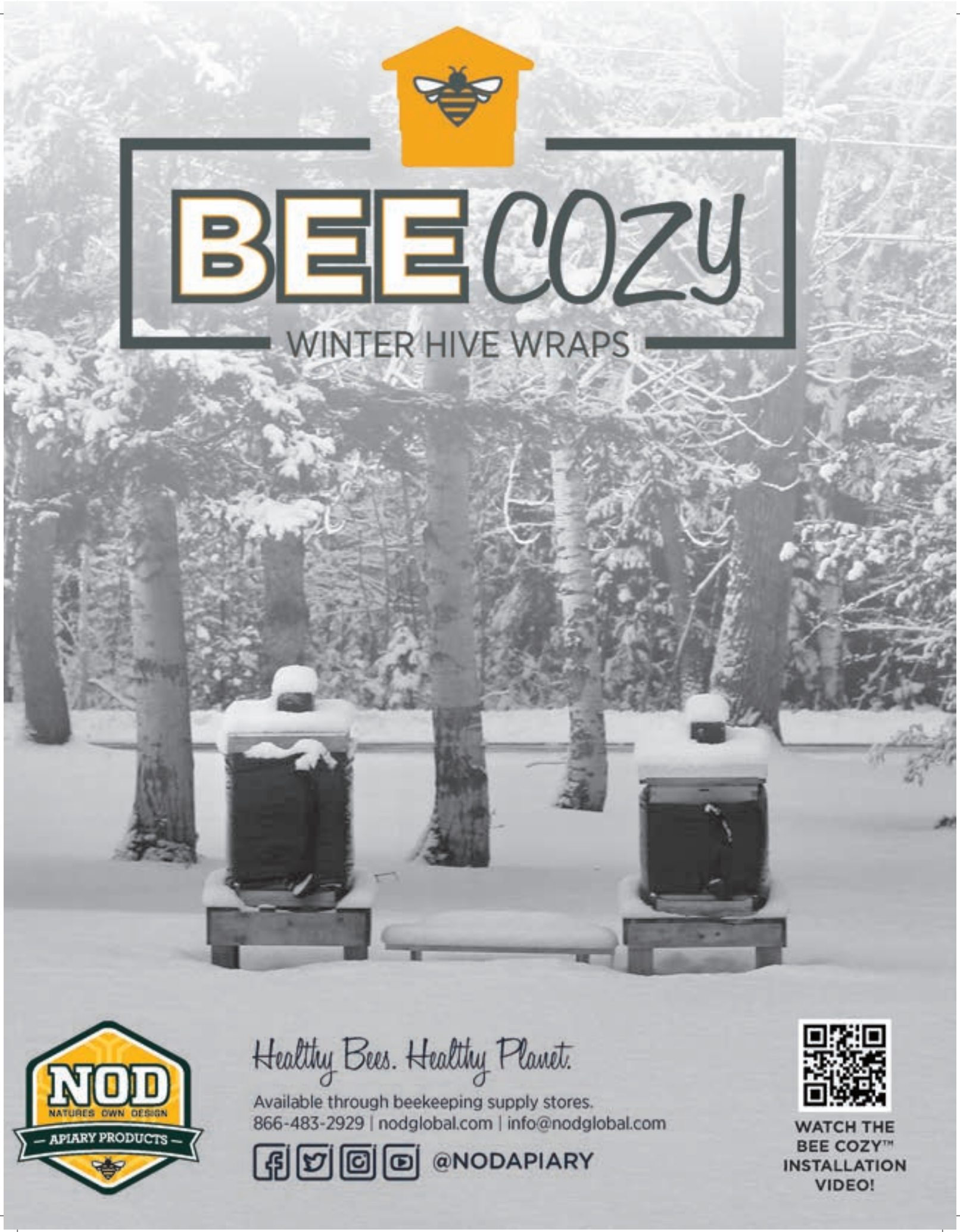
http://www.honeycouncil.ca/images2/bh/Canadian_Beekeepers_Practical_Handbook_to_Bee_Biosecurity_and_Food_Safety.pdf -great recording keeping resource.

"Cleaning Equipment." *The Management Agency, National American Foulbrood Pest Management Plan New Zealand*. **https://www.afb.org.nz/cleaning-equipment/**

"Hive Cleaning and Sterilisation." *National Bee Unit: The Food and Environment Research Agency*, Oct. 2010. **Nationalbeeunit.com.**

Vidal-Naquet, Nicolas, Honeybee Veterinary Medicine: *Apis mellifera L.*, 5m publishing, 2018.pp 192-204. Also contains a helpful sanitary audit checklist/ record form appendix.

The Honey Bee Veterinary Consortium (HBVC) is developing biosecurity guidelines for veterinarians. **https://hbvc.org**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PRESCRIBED FIRE

It Might Be Just What The Bees Need

Richard **Hines**

If you are a beekeeper, keeping a close watch on which plants bees are foraging on is essential. As a retired wildlife biologist and beekeeper, I also understand how to manage plants and plant communities that are attractive to not only our bees but also native pollinators as well. One of the management tools we use is prescribed fire.

Across much of the U.S., land managers are increasing prescribed fire on the landscape which is good news for native pollinators not to mention our honey bees. Native Americans used fire extensively and early settlers soon learned that managing land with fire was beneficial. However, this changed around the 1930s when wide ranging restrictions were implemented. These restrictions were no doubt the result of large catastrophic wildfires that had occurred in the late 1800s and early 1900s. Even in 2020, several of those early wildfires remain among the largest on record.

Although appearing destructive, plants will begin growing within days following a prescribed fire as this one on a Florida State Park.

National Bobwhite Conservation Initiative Grassland Coordinator Jeff Hodges told me, "some beekeepers don't like fire but in the long-run prescribed fire can be very beneficial". It is all about the management of plant communities and numerous plants across North America have evolved with periodic fire.

Many plants across North America are adapted to fire which restores and assists in the plant's natural history. However, most people see fire and relate it to the destruction of habitat. The difference, wildfire verses prescribed fire. Wildfires burn at the worst possible time when weather conditions make fires unpredictable and uncontrollable. Managed or prescribed fires are ignited when conditions create a "cooler" low intensity burn. Weather and fuel conditions allow fire crews to predict how fires will behave with results beneficial to the land, wildlife, plants, pollinators, and even local honey bees.

Although researchers at North Carolina State University were looking at native bees they determined that "freshly burned long-leaf pine forests had more than double the number of bees and bee species than areas that had not burned in over 50-years". Overall, bee abundance was greatest at recently burned sites with diversity decreasing with time since the last fire.

Tommy Hines from Newberry, Florida, who has kept bees for sixty-eight years said, "in Florida, fire has always been a positive to my operation due entirely to the plant community you get after a prescribed fire…there is little doubt prescribed fires create a bee friendly environment".

Among dozens of plants responding positively to fire is partridge pea which provides nectar toward the end of Summer. Native grass pastures, if burned, have a much higher diversity of bee and pollinator friendly plants than do the typical mono-culture hay fields.

In Missouri, Jeff Hodges noted large numbers of honey bees utilizing beardtongue after this species rebounded

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following a prescribed fire the previous year.

It is during late Summer nectar dearth that bees are dependent on numerous native plants such as partridge pea. Hines added, "beekeepers are always focused on the major honey flow but at certain times of the year it is the minor sources of nectar and pollen that are important but overlooked by many beekeepers".

States like Minnesota are beginning to use prescribed fire to maintain roadside vegetation because it has been demonstrated to be effective in management of plants, eliminating non-native invasive species and promoting native plants particularly species pollinators are attracted to.

A well trained member of fire crew igniting prescribed fire for desired habitat

But the use of prescribed fire cannot be taken lightly. Extensive training is required to conduct a prescribed fire and igniting a prescribed fire that will produce positive results is a combination of experience and science.

All plant communities respond differently to fire. Different site conditions not to mention fire intensity, weather conditions, and a whole host of factors such as time since last fire referred to as a fire return interval (FRI) all determine outcomes. For instance, the FRI in arid regions may extend to ten years or more while grasslands in the south or mid-west may have normal FRIs of three to seven years.

Fire ignition methods are also critical and fire crews are well trained to determine the actual type of fire needed to develop the desired outcome. While prescribed fire can create conditions perfect for pollinators, it can also be temporarily harmful for some pollinators. Hodges said, "ideally when you are focused on pollinator habitat fire crews generally burn smaller units or never more than fifty percent of the habitat". With the reduction in canopy cover, warmer soil, increased soil nutrients, along with additional sunlight the overall increase in flowering plants becomes apparent in only a few weeks. Over time, fire remains beneficial for the populations of insects using native plants and since most prescribed fires are set in early Spring prior to leaf out they should not have a direct effect on honey bee colonies.

Many state and federal resource agencies are beginning to increase acreages of prescribed fire to help restore ecosystems You may have not given much thought to prescribed fire in your local area but if you hear about a resource agency proposing implementing prescribed fire, give them support and rest assured, your bees will like the results! BC

By Heather Moylett, Elsa Youngsteadt, Clyde Sorenson.

"The Impact of Prescribed Burning on Native Bee Communities (Hymenoptera: Apoidea: Anthophila) in Longleaf Pine Savannas in the North Carolina Sandhills"

North Carolina State University

Published: Dec. 27, 2019, Environmental Entomology

DOI: 10.1093/ee/nvz156

Penstemon digitalis, aka beardtongue, the following Spring after burn

zooming To A Bee Meeting

Tina **Sebestyen**

Yet another thing affected by the virus shut-downs this Summer has been our bee club meetings. For some clubs, there has been a negative effect, since they have just stopped meeting, and have stopped all bee club activities. For other clubs, there has been a fairly positive effect, since they have kept meeting, and kept up with other bee club activities, although virtually. The prospect was daunting at first, since many beekeepers do not have good relationships with their computers. Even leadership was daunted because of the reality of having to learn one more new thing, make it work, look good, and be user-friendly for everyone.

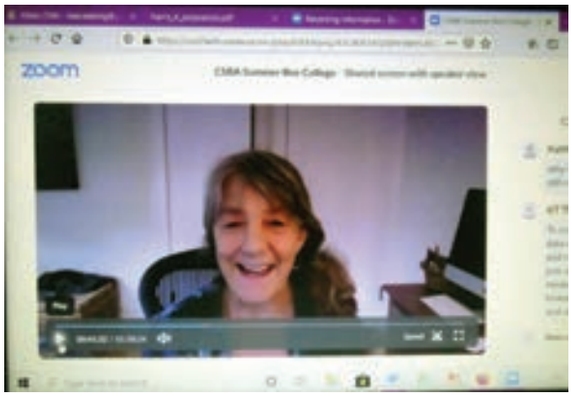
Ed Colby and I get ready for our beekeeper's rodeo, smoker lighting contest. Something this funny could not happen at a regular bee club meeting.

There have been more positive effects than just allowing us to continue meeting. For one thing, attendance has been much higher than at regular meetings. No one has to take the time to travel. My regional bee club covers a very wide area, and we have many members who are willing to drive an hour for the monthly meetings, and many more members who are not willing or able to do the driving. Without the drive, a meeting takes just two hours, not the four it takes with the commute. We still discuss timely beekeeping topics, but now we can also show a video made before the meeting, showing how to do a mite roll, or how to mark a queen, or what foulbrood looks like, and every participant can see much more clearly than they could have in person in the apiary. We could have done this at our in-person monthly meetings, but we had never thought of it before.

Members can still ask questions in a virtual meeting, and it is obvious that they love the chat feature. In "chat", participants can type in a question, and it will be answered by the speaker at the point at which it works well with their talk. No one has to interrupt. No one has to stand up in front of everyone else. They can also "raise their hands," and be recognized to ask a question or make a comment. This allows for back-and-forth conversation between the questioner and the speaker. Until recognized, watcher's computers are muted, which allows for undistracted teaching without the coughing, baby crying, and general rustling that accompanies any crowd.

We all know what bee clubs are like when there is dissension and trouble. It is a lot like a church split, contentious and painful. One club that was at the point of collapse at the beginning of the shut-down has been able to begin recovery and even grow their membership due to on-line meetings. Online, they could get virtually any speaker they dreamed of. They got Tom Seeley for their first Zoom meeting. He drew a huge crowd, and was entertaining and educational, as always. After his talk, they all felt the glow of a great bee club meeting, and no one felt like starting a shouting match on-line. Having to unmute your computer and take your turn takes some of the fun out of shouting matches anyway. In this way, they have been able to deal with their issues one at a time via email, while showing what the new priorities will be (education), and this changed the issues from personality-based to fact-based. People are looking towards the possibilities of the future rather than focusing on the difficulties of the past.

Colorado State Beekeeper's Association recently held their Summer bee college on-line via Zoom. It was wildly successful, according to feedback and remarks. We heard



Marla Spivak answers questions at the 2020 Colorado State Beekeepers Assoc, Summer bee college. Chat questions are on the right.

two talks by keynote speaker Marla Spivak, and one by her PhD candidate, Hollie Dalenberg. We even still had our beekeeper's rodeo, with CSBA president, Ed Colby, and myself, vice president, Tina Sebestyen live on video for participants at home to compete against. Throughout the day, our smokers were monitored for the smoker lighting contest. The miracle of cell phone video allowed a queen finding contest, followed by a live hive inspection

Marla's Power Point is on screen, we can see her speaking to us in the little box upper right, and the chat screen in on the far right.

demonstration with input from both Ed and Tina, with live questions from the audience at home. The pinnacle of the afternoon was the ever-popular experts' panel, with Marla Spivak, Jim Tew, and Kim Flottum. It would have cost a fortune to fly them all to Colorado, but the computer allowed everyone to benefit from their experience, expertise, and humor at a fraction of the cost and time normally required.

There are challenges to using this technology. The first one is the perception, especially by older beekeepers, that it will be too difficult for them to get online, and get their video and microphone figured out. A short practice session a day or two before the first event easily allays these fears. Simple instructions sent with the email invitation detailing how to log in, what link to click on, and how to find and enter the password are a great help. Once people are logged in, verbal instructions on how to find the chat button, how to mute and unmute, and even how to correct the name displayed are very helpful. Once people understand what is expected of them, on-line presentations work well for all.

One of the problems encountered can be difficulty sending the link to the correct email account. If PayPal is used for payment and registration, sometimes the email address linked with the user's account is different from the one they frequently check and expect the link to be sent to. A flood of panicked calls and emails can be expected from people who think the link hasn't been sent, though it is only sitting in another email account. The night-before practice session helps with this, as does having a contact person who is not involved in the running of the meeting.

A mediator makes the running of the meeting much easier. This should be someone besides the speaker, who needs to concentrate on their speaking points and run the Power Point presentation. The mediator monitors the chat panel while listening to the presentation, and may interject questions from the audience at appropriate times, or wait until the end. He can recognize listeners who have the "hand-raised" symbol activated and give them permission to unmute and converse with the presenter. He will also let the audience and speaker know when it is time for breaks, and when they should expect to be back at their computer monitors.

Something that participants might benefit from knowing is how much more difficult it is for a speaker to present on-line compared with how it goes with a live audience. When I am up front doing a presentation, I am not just putting on a show, but interacting with the audience all the time. As I speak, I take clues from the faces watching me. If they look interested, are paying close attention, or are taking notes, I know I am doing well. I can connect even better if one or two people in the audience smile and nod occasionally. If people start yawning, I know I need to pick up the pace, or tell an engaging story, or let them take a break. When people

When I found this queen, every person watching could see her just fine, unlike if all of us had been in the apiary. This is from a video we took in advance of a local bee club meeting, and then showed during the regularly scheduled time.

are watching on their computers, it seems like they forget that I can see them, too. They often don't look like they are paying attention. They chat with someone off-camera, they get up and leave the room. This disconnect from the audience makes staying engaged and engaging more difficult for the speaker. It is like talking to yourself in a mirror. As a member of the audience, be polite, look at the speaker in your computer monitor, look interested (or bored, or whatever you really are), look like you are paying attention. This will gain you a much richer experience. It isn't a television you are watching, it is real live person.

In short, on-line meetings can not only maintain club connections and education when in-person meetings are not wise or convenient, they can also offer advantages for the future that we were not aware of before. Bee clubs can gain greater attendance, more education for beekeepers and the corresponding healthier bees, and easy access to more diverse teachers, while still offering in-hive beekeeper training. Online meetings will never, and should never replace in-person meetings, but some combination of the two, going into the future may confer many benefits. BC

Minding Your Bees and Cues

Part 1: Interpreting Fruit Scents

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

Everyone at the University of Minnesota Bee Squad wears veils and t-shirts when they manage bees. Gloves are discouraged, but not because we are brave or love getting stung up (although we do consider getting some stings as part of the job). We go gloves-free for a few reasons. Our bees are mostly gentle; bees of European stock tend to be minimally defensive. This is important as we keep our bees in areas where behaviors like stinging and guard bee pursuit of perceived threats (Nouvian et al. 2016) would be a community-safety concern. Without gloves, we are super-sensitive to a colony's changing moods: we definitely notice that first sting to the hand and take it as a sign to immediately slow down, cover alarm pheromone with smoke, and move extra carefully so as not to squish bees and trigger more alarm pheromone release.

In our mentoring classes, we teach gloveless beekeeping using our "gentle beekeeping" method. Bare hands become bee barometers that, along with observing scents and bee posture, keep us tuned in to the bees. With gloves, it is easier to go through an inspection without noticing, via stings, that the bees are not happy. Sometimes this lovely method of keeping good relations with our bees doesn't work. Some colonies really are just extra mean. It could be they are bothered by intruders, like skunks, or they are mishandled by a rough beekeeper. They also might be easily triggered because of a genetic basis for defensive behavior. Honey bee colony defense is a complex response to threats (Breed et al. 2004), but beekeepers can work with their bees to encourage gentleness. This could mean replacing a queen and waiting for a few generations of daughters, or a couple months, to change the genetics of the colony.

Two workers releasing Nasonov pheromone at the hive entrance. Photo credit: Becky Masterman

The scents we pay attention to are bee pheromones, or communication signals among bees. Understanding honey bee pheromones is an important part of learning about honey bee biology (Winston 1987) and becoming a better beekeeper. Getting familiar with two bee pheromones that are detectable by our noses (for most people) is a great way to deepen your understanding of bee moods and respond accordingly.

Alarm pheromone smells a little like ripe bananas. Bees produce alarm pheromone when they sting, or when they open the sting chamber at the tip of their abdomens. Even if you can't smell bananas, you can identify the posture of an alarmed bee: her abdomen is pointing straight up and her stinger is visible. We use smoke to inspect colonies in part to mask the scent of alarm pheromone; to disrupt the bees' message that it's time to defend. A beekeeper who is fully covered in protective gear may not feel stings or smell alarm pheromone on their clothing, and so with each movement they increase the defensiveness of the colony they are working. Alarm pheromone reminds us that we need to slow down and move more carefully as we work a colony.

Knowing the difference between alarm and Nasonov pheromones will ensure that you don't confuse a warning signal with a behavior that bees use to group themselves. Have you smelled the lemony Nasanov pheromone before? It is the pheromone bees use to orient each other to "home." Older workers will help future foragers orient to their hive location by secreting Nasanov at the entrance of the colony, and fanning their wings to spread the scent. The posture of "Nasanoving" bees at first might look similar to alarm-producing bees. In both cases, their abdomens are raised, but Nasanov is produced from the 7th abdominal tergite, which is best described as near the end of the abdomen on the "top side" of the bee. When that gland is open (it looks white), the abdomen's point appears to have a slight downward crook. When bees are producing Nasanov, they are docile. Working a defensive colony, a beekeeper might shake a frame of bees in front of the hive entrance to induce them to release Nasonov pheromone, helping their sisters home, and in the process, masking alarm pheromone.

It might sting to learn this information, but research on honey bee venom allergies suggests that infrequent stings make it more likely to develop a bee venom allergy. New beekeepers can consider regular stings part of the rhythm of the beekeeping year. Research shows that getting stung in the Fall and not again until the following Spring (Bousquet et al. 1984), or getting fewer than 10 stings in a year may increase the likelihood of developing allergies.(Muller 2005).

It's a good idea for new beekeepers to work with a partner or mentor, not just for answering questions and

for help lifting boxes, but for safety, too. If you only have a few colonies, there's no reason why your management can't be slow and careful and your inspections can avoid being threatening to the bees. Take time to observe your bees' behaviors and chemical scents; your bees will teach you better beekeeping. BC

A worker in a defensive posture with a drop of venom on her sting. Photo credit: Jessica Helgen

Acknowledgement

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Authors

Becky Masterman led the UMN Bee Squad from 2013-2019 and currently alternates between acting as an advisor and worker bee for the program. Bridget Mendel joined the Bee Squad in 2013 and has led the program since 2020. (Photo of Becky and Bridget from 2014).

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Have A Buzz

words Matter

Leah **Smith**

So, what is all the buzz about? Why have what honey bees do and are provided the origins of so many words and expressions in the English language? Because they have so much to say for themselves, probably. And, obviously, because humans also say a lot about bees. With their agricultural, economic, medicinal, and culinary importance (which has existed for many centuries), is it any wonder that honey bees should also contribute to our language?

Mind you own beeswax. I imagine this expression is not overly used anymore, but it was around for quite a while. What, I wonder, are its origins? To me, being told to stick to your own beeswax suggests that there is something different about everybody's own beeswax. Your beeswax, your business. You can easily tell the difference, as a person, as to what is your "beeswax," but can bees? Well, the worker bees each have eight wax-producing glands in their abdominal segments that make beeswax. When they produce and "shed" the scales of wax in the hive, hive workers collect all the scales and use them to assemble the cells of the hive. Beeswax can be given an approximate chemical formula, which is $C_{15}H_{31}COOC_{30}H_{61}$; it is mainly esters of fatty acids and long-chain alcohols, I am told. Every bee produces roughly the same crystal clear beeswax, but it doesn't remain colorless. The hive workers that prepare it for cell building both chew the virgin wax and incorporate pollen oils and propolis into it, thus giving it the more familiar yellow or brown colors. The final color of each wax is therefore influenced by the pollen oils present. Is it your beeswax if you are the one that produces it, or the one that chews it and makes it distinct with pollen and propolis? That sounds like the kind of point humans would love to debate. Two final points of interest. One, beeswax is only produced by bees of the genus *Apis*, and not by others. Two, 11 species of honey bees, genus *Apis*, have been identified to date; and within the species there are also races of bees, which display further differences. That's a lot of different beeswax.

The dominate figure in honey beehive life is, of course, the **queen bee**. The queen bee gets special food from the start of life (which is why she becomes a queen), special attention from her "support crew," and has her own special schedule to keep and job to do. A woman designated as a queen bee is one who has a dominant position in a particular group; a sphere of influence in which she makes or at least enforces the rules, keeps people in line and on task, and in many ways rules the roost (a mixed metaphor). This isn't to say she doesn't keep busy herself. Human and honey bee queen bees have work to do, just not the kind of work that everyone else does. In the case of the honey bee, she lays eggs and a lot of them. Isn't it funny that the queen bee human owes that title to the queen bee honey bee, whose name in turn was influenced by the lifestyle of humans who are not necessarily queen bees, but simply queens?

Workers returning to the hive.

In a hive, you will find a queen bee and many, many worker bees. **"I'm just a worker bee,"** means someone is one of many, lost in the masses, doesn't really stand out in job or appearance. The most numerous caste in honey bee society by far, anyone who has gazed into the hidden world of a hive knows that it can be hard to find anything else in there except for bodies upon bodies upon bodies of worker bees, doing what worker bees do.

And so in addition to worker bee, we have the **busy bee.** Busy bee—an industrious person. Bees do keep busy. There are 20,000 to 40,000 of them in a typical healthy hive because there is so much for them to do. (Busy) worker bees engage in nest cleaning, brood and queen tending and feeding, comb building, food handling, ventilation, guard duty, nest homeostasis (keeping environmental conditions like hive temperature at a constant level), and orientation and foraging flights. They do not go from one task to another within the span of one day, like a busy human with a home to take care of might. Bees do one task at a time, with the task changing as the bee ages. Not having to be pulled in a dozen directions at once, but rather having task specialization, is obviously a benefit of communal living!

Yes, the busy bee is the worker bee, and the **drone** is just not. The behavior of bee drones has led to the undesirable definition that when applied to humans means, "A person who does no useful work but lives off others." Mating with a queen from another colony is important, but the drone dies in the process. However, drones that do not mate, don't do much else - except eat, and eat and eat. Do bees, "just chill?" Apparently so. Come Winter, when such freeloading cannot be supported by the environmental conditions, they are tossed out of the hive to die. With that sort of an ending, you might almost think of them as falling prey to a honey trap.

A stratagem in which irresistible bait is used to lure a victim. **A honey trap.** Honey is great bait for a trap, especially raw honey. It is sweet, relatively as sweet as

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table sugar but without the attendant insulin surge. And it comes in "flavors" which vary depending on the nectar sources bees are visiting. Non-artificial flavoring in this day and age! Honey contains enzymes that aid in the digestion of carbohydrates, which is why it is particularly suited to drizzling on biscuits, cereal, pancakes, toast, or other grain products. It contains antioxidants and phytochemicals, vitamins and minerals, facilitates the absorption of calcium and selenium, and will promote the growth of friendly bacteria in the intestinal tract. These characteristics are why honey has been noted as helping ease arthritic joints, fighting colds and respiratory infections, aiding gastrointestinal ulcer healing, and working as a gentle laxative, as well as counteracting allergies and obesity. All of these attributes are why honey has been called a super-food and a miracle elixir by some.

Busy bees and a favorite plant, Goldenrod.

What could be more tempting than just honey? How about **milk and honey?** The Promised Land, the land of milk and honey. It is a Biblical reference, of course, referring to a land of prosperity and abundance. I can see how the connections are made. Milk and prosperity, because you get your milk from sheep or goats or (the big ones) cows. Merely having animals has always been a sign of wealth. Isn't a bride worth her trade in cattle? In farming, everyone knows to start working with animals requires more up-front capital, but also tends to give higher returns; more money at both ends of the equation. And we all remember that the Latin root of pecuniary (relating to or consisting of money) is *pecu*, meaning "cattle, money." Cattle is the same as money in the bank. Whereas honey partners with abundance, like standing in a cornucopia with everything readily available and at hand. This could be referring to times when people would find "honey trees," a wild beehive with honey in it just for the taking of any who finds it. No buying, no tending, just harvest. Having some small experience with both cattle and honey bees, I would agree with the definition of cows providing much and allowing you to prosper at the price of work, while honey bees do a great deal of their work themselves and provide you with a bonus at harvest time. I know it is a slightly different story for those who have large apiaries; I guess what they are dealing with is truly mini-livestock!

If you are in a land of milk and honey, surely you won't be honeycombed. **Honeycombed** can have a few meanings. It can mean filled with holes or cavities, as in hills honeycombed with mines, potatoes honeycombed by grubs, or a honeycombed lawn, courtesy of moles. Honeycombed can also refer to infiltration and subversion, to weaken or injure. Honeycomb an army, a team, a marriage. All of these uses of honeycomb paint rather negative pictures. It seems a beehive is no place humans would want to live, surrounded by all of that subversive honeycomb.

I don't know, though. **"A hive of activity"** has always had a rather nice ring to it. It is used to describe a place in which people are busily occupied. Active, engaging, interesting. Not a sweatshop, not working like a dog. A hive of activity sounds like an exciting place to be.

This vibe spills over onto buzz. **Buzz**. Worth repeating, as there is never just one buzz. It is the sound made by insects, often honey bees. And when applied to human situations? It could be a rumor. A feeling of excitement, as in "I got a." Or that old optimistic activity and exhilaration thing again. A buzz word. Buzz off. The word fairly flies off the page (like a *Hymenoptera*, one expects).

What I can't understand is why **royal jelly** (honey bee secretion; substance fed to all larvae for three days, but then fed only to queen larvae so that they develop as such) isn't synonymous with ambrosia (the food of the gods, otherwise known as anything pleasant to taste or smell). This is ambrosia! This is royal jelly! I think they work equally well. After all, royal jelly makes you into a queen; it should be good. To my surprise, I looked up ambrosia and found it is another term for bee bread. I looked up bee bread and found it is pollen and honey packed together with saliva and that, after fermentation, it serves as food for nurse bees who, in turn, secrete the royal jelly. Anyone can see that bee bread isn't ambrosia. And why? Because it is, literally and figuratively, not royal jelly.

How is that for honeyed phrases? BC

Home Security

Jessica **Louque**

It's definitely been a weird year. In some ways, it has not been so bad here. I like my kids being home and spending time with them. They work for us and we don't have to leave our community for most of our bee work, and we only have one other person working with us on a full-time basis who is practically family anyway. We don't have many in-person interactions with non-family members or go in town except for groceries, gas, or field equipment. I don't particularly like being around other people anyway, so this shutdown hasn't affected me socially.

As I mentioned in an earlier column, strange things are sold out, which has been the biggest problem for us because it can create work issues. It's been difficult to get enough sugar to feed our bees, and bee equipment was harder to get than normal. It looks like we're trying to predict the next shortage that's not toilet paper, which seems to be Dr. Pepper and OTC medicine based on what I've heard floating around. I'm sure the Dr. Pepper has been pointed out to me because I live on it like fish need water, but the medicine part is a much more worrying rumor.

When people hear a phrase like "home security" it's probably rendering images of alarm systems and guns and maybe the last Rambo movie. There are many things that can create a sense of security, and being able to protect yourself is one of them. However, protecting yourself is not always just defending yourself. This also includes being prepared for emergencies and problems and being able to take care of your home and family.

Every year, there is always a problem trying to get bee equipment and bees. I would suspect it will get harder to buy equipment if people decide to turn to beekeeping more in the future to guarantee a sugar source at their homes or pollinate home gardens. If you're reading this, you're probably already ahead of the game and have a few hives at least. I would suggest either learning how to make bee equipment on your own, or buying equipment during the "off-season" of equipment sales to have in stock at your house should you need it. At the very least, you could always buy unassembled equipment that is cheaper and takes up much less space to store until you need it. A hive body isn't going to go bad, and even foundation can be kept fairly easily without ruining it.

It's been hard here to find mason jars. This isn't everyone's first choice for honey bottling, but it's usually a quick find at most any grocery store. More people are trying their hand at canning right now and it's not an easy thing to find a case of jars in any size. If you are planning on harvesting a large amount of honey, you might want to order extra bottles in case there is difficulty in purchasing those, or buy mason jars if you happen to see them when you're out. Even if you use bottles for honey, you can always use them for canning. It's not a bad idea to consider using honey to barter. I am not sure if the coin shortage issue that we seem to be having is widespread, but if the government can truly take away our ability to use cash, we will be exceptionally limited in our personal choices. No more cash for small jobs, farmers' markets, birthday cards, or saving for a rainy day. One slip of the power grid, and maybe everything has been erased, or your accounts are all frozen. Hopefully this is not a long-term problem and I am vastly over-reacting, but I don't really trust anything I've seen lately and I find it to be safer to expect the worst and prepare accordingly.

In my past writings, I've gone over what I keep as an every day carry (EDC) and what I thought might be good things to keep with you in the bee yard. Self reliance is always an important part of what I would consider home security, and most beekeepers are at least partially on that path. I might have once said that we were extremely rural and have to prepare for taking care of ourselves if no help comes, but with the way that things have been going in cities lately, I don't know that urbanites can expect help any faster than we could now. It pays to be prepared. If you are keeping bees, some of you will have them close to your house and in easy access. Some of you will have them at different sites and farther from your house. This may change your overall plan, but I hope it will at least make you evaluate your situations.

An ambulance could not get to our house under most conditions. Even if they did, the nearest hospital is at least 35 minutes away. We always have to be mindful of at least basic first aid and some emergency response in different situations so we can be prepared if we have to deal with an injury or illness. From a beekeeping perspective, there are all sorts of things that can go wrong. Just from personal experience, I've burned myself to varying degrees with a smoker, ripped my pants or shirt on metal, branches, blocks, and rocks, sometimes even hive lids. I've stabbed myself with hive tools, nails, pollen traps, wire, and plenty of other things. I've dropped heavy boxes or cinder blocks on my foot, been stung by a couple hundred bees, stung by hornets and wasps, bit by spiders, tripped in holes, been bit by snakes, and chased off raccoons.

An antihistamine and hydrocortisone cream are essential to the beekeeper's medical kit

I'm sure I've forgotten some things, but this is a pretty wide variety of issues that can happen, all in varying degrees of severity and treatment.

There are a lot of situations that you may not even know you will react until it happens, both mentally and physically. I didn't know I was allergic to spiders until I had one crawl down the back of my beesuit in Germany and came home with a rash across my back that looked like I was whipped. Bees are typically outside, and there's lots of outside things that don't always agree with the human body. Keeping hydrocortisone cream and Benadryl on hand is always a good idea with bees in the first place, but can be useful with all the non-bees out there with you too.

Honey is by far the best open wound and burn ointment I've ever used but it's not always readily available in a hive that you're working . . . and probably not the best thing to coat yourself with while working in bees. Keeping some burn cream and some bandages of varying sizes nearby can be great for the time you knock the smoker off and catch it with your bare hand before you think about it. Keeping duct tape around is also helpful because bandages don't always stay on well, or it can fix the hole in your clothes so the bees don't go in it. Scissors are not a bad idea either, and I like to keep medical scissors on hand. If you want to splurge, you can buy the Leatherman Raptor scissors that will cut through just about anything. They are meant to rip through seatbelts and could cut through ratchet straps, denim, and bee suits if necessary. Super glue is also good to have around so you can close small wounds with it instead of stitches. I also like to keep some blue kote and red kote on hand. For those of you who work in livestock, you'll probably recognize this as a wound dressing for horses and mules... or at least that's what we had it for. It also works on children, or if you scrape your skin off your arm or leg and don't have a bandage the same size as what you did and you don't want it to weep on your bee suit while you finish in your bees.

If you're really looking to go all-out, there are several variations of medical kits available on-line that are premade and ready to go in all levels of severity, treatment, and cost. Most wilderness kits will be more than sufficient for beekeeping, but you may want it as more of a catch-all besides just beekeeping. We have a couple med kids of varying degrees, but one is fully stocked with everything from a CAT (tourniquet) to hyfin chest seals and Israeli bandages since we also hunt and fish and have a higher likelihood of having traumatic wound injuries. I personally like to use some of the full kits and augment it with supplies that I like best. Northern Rescue has a lot of good kits, and there's always Amazon (except currently they are sold out of almost every version of a "real" disaster med kit). Most of this isn't really useful if you don't know how to use it though.

One of my biggest soapboxes to stand on is shouting at everyone to educate themselves. Taking classes is the least you can do to improve yourself and learn new things, and sometimes those things can save you. It is definitely harder to take classes right now, but YouTube has a myriad of videos that can do a walk-through of basic emergency response. Use your common sense to determine if it's a legitimate source. I do like to have certifications for classes that could come in handy, like First Aid, CPR, or First Responder, but it's not necessary if it's just for yourself. You could always ask to sit in a class with your local fire department/rescue squad or give them a donation to let you attend. Fire Fighter classes can be just as important if you're in a bad situation or you are clumsy with a smoker. You may even decide to volunteer for your VFD and add experience to your knowledge. I also am a book hoarder and I like to keep reference books for first aid and medical support in case I need it or want to look at it again.

The most important thing that I hope everyone takes away from this is to take the necessary steps to take care of yourself and your family. Pick up some extra ibuprofen, aspirin, naproxen sodium, and acetaminophen if you can. Add some allergy meds and Benadryl to your cabinet, along with bandages, eye wash, and cold and flu medicine. Keep some honey labeled just for medicinal use with your burn cream and cortisone cream. Most of these things aren't going to go bad, and if you're anything like us, you'll use it sooner or later. Times are hard for some people and I know this could easily be extremely expensive, but it is certainly something to consider if possible during these times of uncertainty. I hope everyone takes the time to make a game plan for themselves and their family based on what's best for their situation. Stay safe everyone! Take care of your bees because they might be the currency of tomorrow. BC

Do Beekeepers Like Saving Money?

Beekeepers now really don't have a choice.

John **Miller**

The past ten years in beekeeping have been unlike anything commercial, sideliner, and hobbyist beekeepers have ever seen. Commercial operations have seen the supply of good strong hives chase the demand for good strong hives providing pollination services. Prices for almond pollination services for the best hives now exceeds $225/hive. Sideliner beekeepers enjoy robust demand for pure, local honey, beeswax, and honey-based products. More hobbyists enjoy artisanal beekeeping than any previous time. We all learn important truths about husbanding our hives and our businesses – whether multi-state or strictly local.

Change is constant. One of the biggest changes is how we prepare and care for hives over Winter. Nearly a million beehives will Winter indoors in America in 2020. Indoor Wintering is not new. George Krause wintered bees in Fremont County, WY in 1925 – in a potato cellar – because there was no other way to Winter bees in Fremont County, Wyoming. Indoor wintering has changed. I also used to Winter bees in potato cellars, and did not like it for several reasons. Mostly because I had no control when cellars would become available, written agreement or not – sometimes cellars don't empty – and cellars are filthy.

"I also used to Winter bees in potato cellars, and did not like it for several reasons. Mostly because I had no control when cellars would become available, written agreement or not – sometimes cellars don't empty – and cellars are filthy." **https://en.wikipedia.org/wiki/File:Old_Potato_Cellars_near_Shelley,_Idaho.jpeg#filelinks**

When I speak of indoor wintering in 2020; I refer to well-constructed structures with modern climate controls. These buildings are not cheap. Indoor wintering is not the exclusive bailiwick of commercial beekeepers. Several sideliner and hobbyist groups seriously explore indoor wintering in a cost-shared model. Several designs exist for beehive cold storage. The Canadians have decades of experience wintering bees indoors in good tight buildings. American storage buildings tend to be larger. It's not unreasonable to factor $120/psf in construction costs. With 20' – 22' side walls, a building can store one hive per square foot +/-.

If a group of Michigan beekeepers want to store 6,000 beehives inside a 60' X 100' building @ $120/psf it will cost around $72,000. It's a lot of money for a guy with 500 hives; but not a lot if it's 12 guys with 500 hives.

Will it improve operations? What are the Winter losses in a 500 hive outfit? The arithmetic is pretty straight forward. 35% losses are higher than 10% losses. The very best operations can expect 5% losses in a good building. However, a Building Is Not A Hospital. What you put in will be no better than when you take those beehives out. And, those losses have to be made up the following Spring; adding aggravation to misery if the bees were weak, diseased, parasitized, too light going into the building.....

In one operation, Winter losses dropped from 35% to 7%. On a 20,000 hive outfit the numbers can be staggering. 35% losses = 7,000 dead hives that will make no pollination income, whether in Michigan or California. For you beekeepers in Rio Linda, that's $1.4 million dollars. Those 7,000 hives have to be made up @ say, $100/hive – that's another $700,000 for a total economic swing of $2.1 Million dollars. The arithmetic is the same for an outfit of 200 hives.....just eliminate a couple of zeros.

Where can beekeepers access the kinds of money for indoor storage? One way is to rent the storage. Many beekeepers take this route. Rental costs are not insignificant. Terms and conditions in the rental agreement deserve thoughtful consideration. It costs less to rent space in the short term, say 6 years, than ownership. Ownership carries it's own challenges and opportunities. Refrigerated space, if owned, and located where a beekeeper operates - has multiple purposes. Our building is in Gackle, North Dakota. North Dakota is the Saudi Arabia of cold air in winter. The building still requires Costco-sized refrigeration capacity, because those bees generate heat all Winter. What we have learned in addition to the ability to successfully store bees in N.D. is that the building has other uses. We have zero wax moth problems. We have a safe place for our trucks. We have an excellent building to host our Landowner Appreciation Day. Our equipment, the beehives, pallets and lids last longer in dry, cool, stable storage. Our bees don't get stolen; or sprayed, flooded or burned.

Next month I'll share what we learned about financing refrigerated beehive storage space. BC

THE CASE FOR PERMANENT INSU TION

Warmer In Winter/Cooler In Summer

Bruce **Moechnig**

We all know how much insulation helps to keep our homes warmer in the Winter and cooler in the Summer, while reducing energy needs for both heating and cooling. What if we applied the same practice to our beehives? I have, and I've found that the bees consume much less honey over the Winter, generate less moisture and are generally healthier in a well insulated hive. My experience over the past several years, along with a comparison to the Langstroth hive, is presented in the rest of this article.

I was introduced to the concept of the insulated horizontal hive when one of our club members discovered the book "Keeping Bees with a Smile" by Fedor Lazutin. The author's approach in his hive design was to closely simulate the honey bee's natural home – the tree cavity. The value of insulation became clear to me as I read the book. Based on the diagrams in the Appendix, I designed and built eight insulated horizontal hives in 2016. After a year's experience I refined the design to alleviate some shortcomings that I had noticed, retrofitted the units and now have three more years experience with them. A picture of the hives is shown in Figure 1.

Figure 1 View of horizontal hives (photo courtesy of Molly McCarthy).

The body of the hive consists of a framework of 1½ inch by 1½ inch wooden members with 1½ inches of rigid styrofoam insulation in the open spaces in the framework as depicted in Figure 2. The inside is lined with ¼ inch plywood and the outside with tongue and groove siding. Calculated R-value for the sidewalls is 8.87, compared to 1.06 for a Langstroth hive. An eight-mesh hardware cloth floor is mounted ¾ inch below the bottom of the frames and below that is an approximately 4½ inch high chamber inaccessible to the bees. Access to this chamber is through a door in the back of the hive through which a clean-out tray is inserted to catch detritus from the hive, as shown in Figure 3. During the Summer, this tray holds a layer of diatomaceous earth and in Winter a layer of pine shavings. Ventilation of the hive is through four 1-inch diameter holes drilled in the chamber access door at the back of the hive and through the three entrance/ventilation openings in the front of the hive. No ventilation

Figure 2 View of tray with diatomaceous earth inserted into chamber below hardware cloth floor. (Author's photo)

occurs through the top of the hive.

The lid of the hive consists of a 1½ inch by 3-inch framework, containing three inches of rigid styrofoam insulation. The bottom of the lid is again lined with ¼ inch plywood, with a roof over the lid to provide shading from the Summer sun. Calculated R-value for the lid is 15.3, compared to 0.63 for a Langstroth hive.

To illustrate the value of insulation, let's first take a look at current practice. For the Langstroth hive, current recommendation is to leave 45 to 55 lbs of honey in the hive to get the colony through the Winter. Let's assume that the colony contains 30,000 bees and that they consume 50 lbs of honey over six months (183 days). I'm going to convert the 50 lbs of honey to grams (g) by multiplying by 454, yielding a value of 22,690 g (this makes the numbers a little easier to picture). To find the amount of honey consumed by each bee, divide 22,690 g by 30,000 bees to arrive at 0.756 g of honey per bee. Over the 183 days, this yields 0.756/183 days, or 0.0041 g of honey per bee per day. A quick internet search reveals that the average bee weighs 0.00025 lbs, or 0.1135 g (0.00025 lbs x 454 g per lb). Thus, each bee is consuming 3.61 percent of its body weight in honey each day (0.0041 g divided by 0.1135 g times 100 to get into a percent). This would be the equivalent of me, at 220 lbs, eating 7.95 lbs of food per day. I hate to think what I would look like after six months of that, but I do

know it wouldn't be pretty.

By contrast, in the Fall of 2018, I weighed eight of my insulated horizontal hives and weighed them again in the Spring of 2019. The Fall date was just after a killing frost on October 22, 2018 after which no blooming plants would be available. The Spring date was March 24, 2019 when I first noticed pollen being brought into the hives, for a duration of 153 days. Of the eight hives weighed, I had reliable data for 7 of them. The average weight difference between Fall and Spring, assumed to be the weight of honey consumed during that period, averaged 12.9 lbs. Following the same analysis as above and again assuming an average of 30,000 bees per hive, each bee was consuming 1.12% of its body weight each day. Again for me that would translate to a daily food intake of 2.46 lbs, a much more reasonable amount.

Clearly the insulation conserved heat and led to the bees consuming much less honey over the course of the Winter. The dramatic reduction in honey consumption leads to two other key benefits.

In bees as in humans, the byproducts of the metabolism of food are carbon dioxide and water, along with energy and metabolic waste products. On page 286 of the book "Keeping Bees with a Smile," Fedor Lazutin presents the chemical equation for the oxidation of fructose and/or glucose. Based on the equation, for every 60 g of honey consumed by the bees, 40 g of water vapor are generated, or 0.67 g of water for every g of honey. For our Langstroth example, this would yield 15,200 grams of water (22,690 g times 0.67). Dividing 15,200 g by 454, we arrive at 33.5 lbs of water, or 4.02 gallons. Over the course of 6 months, this is 0.67 gallons per month.

Again using the same analysis, the bees in my hives produced 8.64 lbs of water over the roughly five month period, or 1.04 gallons. Per month, this works out to 0.21 gallons per month (just under a quart). We know that some of this moisture will exit the hive through the ventilation openings due to normal diffusion of the water vapor from areas of high to low partial water vapor pressure. In my opinion, natural diffusion along with the reduction in moisture and a bed of moisture absorbent pine shavings in the bottom of the hive, allows the bees in the insulated hive to control the moisture conditions in the hive to their needs. No additional ventilating of excess water and, along with its heat, through the top of the hive is deemed necessary.

The other benefit of reduced honey consumption is reduced buildup of fecal matter in the bees' digestive system. This reduces the stress on the bees, particularly during prolonged periods of cold when they are unable to leave the hive for a cleansing flight.

Returning once more to the moisture conditions in the hive, Zachary Huang, Department of Entomolgy, Michigan State University, E. Lansing, MI references research that shows Varroa mite reproduction was dramatically reduced in laboratory trials when the relative humidity was above 75% (**https://bee-health.extension.org/varroa-mite-reproductive-biology/**). With control of hive conditions up to the bees, it is my opinion that this humidity level is achieved in an insulated horizontal hive. During my inspection of the diatomaceous earth in the trays this Fall, I was unable to find any evidence of Varroa mites that had dropped off of the bees. While this indicates a potential absence of mites in the hives, I intend to conduct mite tests during the Summer of 2020 to confirm and quantify their presence or absence. In addition, I weighed the hives in the Fall of 2019 and will weigh them again in the Spring of 2020 to gain additional data on Winter honey consumption in the insulated horizontal hives.

In summary, I've demonstrated that the insulated horizontal hives I'm using result in the bees consuming much less honey over the Winter leading to less moisture generation and accumulation of fecal matter in the bees' hindgut. As a result, I believe the bees are able to maintain hive conditions to their benefit leading to a reduction in Varroa mites due to higher humidity conditions present. It stands to reason that the resultant reduction in stress on the bees allows them be remain healthy through the Winter and rested and ready to go work in the Spring.

BC

Internal construction of insulated horizontal hive." (Author's photo)

Flowering Strips = Infection

Mick **Kuikowski**

Flowering strips – pollinator-friendly rows of plants that increase foraging habitat for bees – can help offset pollinator decline but may also bring risks of higher pathogen infection rates for pollinators foraging in those strips.

Researchers from North Carolina State University and the University of Massachusetts Amherst show that flowering strip plants generally benefited bee colony reproduction by adding floral resources for common eastern bumble bees (*Bombus impatiens*). The results came with a tradeoff, however, as bumble bees exposed to certain plants showed higher rates of infection by a bee pathogen acquired on flowers – *Crithidia bombi*, which is associated with reduced bee-foraging abilities as well as mortality in food-compromised bees.

The study showed that certain "high-infection" plants doubled *C. bombi* infection intensity when compared with "low-infection" plant species. Bees feeding mostly on canola plants – a major bee foraging plant and important U.S. crop – showed infection levels between high- and low-infection plants.

Nonetheless, all bee colonies that foraged on flowering strips – both low-infection and high-infection types – showed increases in reproduction relative to bees that only had access to canola.

"We wanted to know the effects of flowering strip plant species on the health and reproduction of bumble bees," said Rebecca E. Irwin, professor of applied ecology at NC State and a co-author of a paper describing the research, published in Proceedings of the National Academy of Sciences. "Flowering strips are becoming more common as people look for ways to mitigate pollinator declines."

The researchers used information gleaned from a previous study to split flowering strips into low- and high-infection portions. Low-infection plants included sunflower and thyme, while high-infection plants included swamp milkweed and purple loosestrife.

"In a prior study, we evaluated 15 plant species by putting the same amount of *C. bombi* on each, letting a bee forage, and then seeing whether and how bad of an infection it developed," said Lynn S. Adler, professor of biology at UMass Amherst and the corresponding author of the paper. "We used that to designate plant species as 'high/low infection' for this study."

Researchers placed bees in tents with the crop plants and either high-infection flowering strips, low-infection flowering strips or no flowering strips.

"The bees were all infected with the same amount of pathogen and then allowed to forage, so the plants could increase or decrease infection," Adler said.

Adler said the flowering-strip trade-off – more bee reproduction but higher pathogen infection rates – may be acceptable.

"It depends on how critical food versus the pathogen is for pollinators," she said. "Crithidia is somewhat benign, but if these patterns hold for other pathogens like Nosema, a common honey bee disease, it may be more of a concern. Right now I would not recommend stopping our investment in flowering strips."

The researchers hope to continue examining the effects of flowering strips on bee populations and health by including other bee species and pathogen types.

"I think we need a much more comprehensive program to evaluate how pollinator habitat characteristics affect pathogen spread to make informed choices," Adler said. "In the meantime, providing flowering resources in pollinator habitat is still the best path forward."

Paper co-authors include Nicholas A. Barber from San Diego State University and Olivia M. Biller from Thomas Jefferson University.

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BC

Flowering strip plants like sunflowers can help increase bee reproduction, according to a new study. Photo courtesy of Ben Barnhart

Swarm Team Captain

G 10 20 30 40 50 40 30 20 10 G

Stephen **Bishop**

After my old farm coach, Lowry, critiqued my thumb hammering technique, I began to appreciate his constructive belly laughter. True, my hammering was still scattershot, but I had recently honed several other basic farm skills, like jumping fences and tying complex knots with lots of loopdyloos. In fact, most of my knots were admittedly one-offs, best seen as small works of art that could never be replicated again and best fit for a museum setting. Sometimes Lowry would gaze so intently at one of my knots, trying, I suppose, to decipher the existential meaning in my handiwork, that his eyes would cross and he'd have to sit awhile. Little did he know, I belonged to the knot-tying school of aestheticism, whose only purpose was to tie knots for beauty's sake, and thus my gnarls of cordage had little deeper meaning.

Yet, with each skill I mastered, trivial though some may seem, my development as an all-around farm athlete progressed. So far, I had competed in and survived many tests of athleticism in Lowry's version of the barnyard olympics: high-tensile fence hurdles from yellow jackets, hot barn roof bobsledding, crawlspace gymnastics, Greco-Roman pig wrestling, and corral dodge bull. But my best event, by far, was synchronized swarm catching. Basically, I was captain of the swarm team, mostly because Lowry didn't like fooling with bees, but also because I exhibited a calm demeanor when I wasn't hyperventilating and quaking.

As a sport, swarm catching is part skill, artistry, and muscle memory. With practice, most muscles can be trained to twist and contort when stung to produce a poignant flailing routine. Still, swarm catching is fiercely competitive, with only the best and most dedicated athletes making it to the major leagues of swarm catching—the 911 swarm call list. This prestigious list contained local beekeeping legends like Smokeless George Jackson, Mad Drone McSwain, and Tim the Sultan of Face Swats. Whenever a member of the general public called 911 to report a mass movement of bees, the dispatcher would contact a beekeeper on the list. I'll never forget the Saturday evening I got called up. It was a balmy evening, quite hazy, as I remember, or possibly that was just lingering smoke from my neighbor Tightwood's truck.

The Call Up

On that balmy Saturday, the 911 dispatcher said a swarm had landed earlier that day on a tree near a football field in a local park, causing mass panic among the pee-wee league football fans. All other beekeepers were unavailable, and I, in fact, was the last person on the list. By the time the dispatcher finally resorted to calling me, dusk was an hour or so off.

So with great haste, I immediately called and summoned the other two swarm team members, Lowry and Tightwood. Then I gathered ladders, a chainsaw, shotgun, and all the other tools I might need for a safe swarm removal. Tightwood eagerly arrived armored in a welding mask, rubber kitchen gloves, and leather motorcycle chaps. All the seams of his clothes were accessorized in silver duct tape. On the other hand, Lowry hardly exuded the urgency I would hope to see in a good swarm catcher. He only agreed to go because the pee-wee football game piqued his interest. Having already retired for the night before my fateful call, Lowry arrived in blue flannel pajamas, bedroom slippers, and enough aftershave to singe my nose hairs. We loaded up and piled into Tightwood's old truck for the journey to the Buffalo Shoals Memorial Ballfield. Although Tightwood had recently been let go from the Buffalo Shoals Volunteer Fire Department, he remembered his training. He used emergency swerving protocol and horn-blowing to make record time, so much so his truck easily cut through the smoke billowing from the engine.

On arrival, I could tell the parks director, a hyperactive little fellow, was impressed with our rapid arrival from the way he starred, mouth gaping, as Tightwood inquired through his welding mask about the closest source of water for the radiator.

"Are ya'll the beekeepers?" the director asked, warily.

"Yes sir," I said, "if you'll kindly direct us to the location of the swarm, we'll take it off your hands." But I really needn't ask because I could tell from the group of people staring and pointing that either the swarm was at the top of an elm tree or someone got a football stuck from a wayward punt. Upon closer inspection, it was indeed a ball of bees writhing on a limb at the top of an elm. I felt honored, and admittedly a little nervous, to be able to catch a swarm in front of such a big group of fans. Swarm catching was a great spectator sport, and as I walked up to examine the tree, the crowd even cheered. Meanwhile, knowing I had the situation under control, Lowry walked over to catch the pee-wee gridiron action, which I took as a true sign of confidence in me.

"It's pretty far out there on that limb and high up," Tightwood said. Indeed, it looked a lot higher up than the 911 dispatcher had described, especially standing directly under it. Although dispatchers are supposed to gather and disseminate facts to first responders, this dispatcher had clearly fed me misinformation. Instead of 10 feet up, the swarm was nearly double that in elevation.

"Good thing we brought the chainsaw," I said, trying to exude confidence. "I sharpened the chain a few years ago for emergency situations like this. We'll slowly cut the limb at the trunk, and lever the swarm down to us."

"Cut the limb at the trunk! No sir, you can't cut that whole limb," the parks director shrieked, even grabbing his whistle like he was about to call a foul. "That'll ruin that tree and make it look all whopsided. Remember this is a park, sir" Clearly, the director was part of the tree-trimming school of aestheticism, a small but growing number of arborists who believe trees exist for beauty's

sake. As a member of the knot-tying school of aestheticism, I could commiserate with this sentiment so I quickly advanced plan B.

"Well, I suppose we'll have to shoot it down," I said. "I normally don't like doing that on account of possibly killing the queen, but I'll go get the shotgun."

"Shotgun! You can't bring a shotgun out here!" the director shrieked again, "What if you shoot someone?"

"It's just bird shot," Tightwood pointed out. "Nothing that could hurt a man."

The director blew the whistle, with a long drawn out trill. At first, I thought this might be an attempt at twanging, an old school method of swarm retrieval in which loud noises and vibrations allegedly lure bees down from the heavens. However, after further investigating the director's scowl and tone of trill, I realized he was generally displeased with our plan B. To try to persuade him of the plan's merits, I vouched for Tightwood's marksmanship with a shotgun, saying, "Don't you worry, sir. Last year, in our sunflower field, Tightwood bagged his limit of doves without missing a single shot."

He blew the whistle again. "Son, I'm giving you one more chance, anymore cockamamie ideas with chainsaws or shotguns and you're out of here."

Thankfully I'm a quick thinker and came up with a much safer idea. It was really a brilliant stroke of engineering on my part. I said, "If we extend the extension ladder straight up and as high as it can go, bracing and stabilizing the bottom of the extension ladder against the A-frame step ladder, then I think I can reach the swarm."

"No chainsaws or shotguns?" asked the director.

"Only ladders and a pair of loppers to cut the little limb at the swarm," I assured.

"Ok," said the director, finally releasing his whistle.

Problematic Problem Solving

So the situation was like this: Tightwood and the parks director held the eight-ft A-frame step ladder steady. Tied to the A-frame ladder was the bottom of a 20-ft extension ladder, its top fully extended and wavering unsupported in the airspace below the limb wrapped with writhing bees. At the top of that extension ladder was a man in a bee veil. I was just about to cut the limb with a pair of loppers when I heard that stupid ear-splitting whistle.

"Wait!" the director shrieked.

"What," I shouted back annoyed, having already dropped the loppers once and having just figured out how to brace one lopper handle against the ladder and apply pressure to the other handle to perform the cut, all while wavering and quaking.

"If you're holding the ladder with one hand and cutting the branch with the other, how are you going to hold the branch to bring down the swarm?" the director asked.

"I'm not," I answered back, "I'm going to let it fall to the ground."

To be honest, I was starting to wonder about the parks director's qualifications. For someone who was supposed to be educated in sports, he seemed completely ignorant of the rules of swarm catching.

"Swarms don't sting," I shouted back, annoyed.

"Young man," he said, "I'm not worried about me. I'm worried about you. If those bees hit the ground, I will not be holding this ladder anymore. It's not worth you dying."

"Better come down," Tightwood growled, shaking his masked head in disappointment at the director. Yet, after I descended the ladder, I felt disappointed in myself, as if my rookie debut was a major league flop. The director was now threatening to eject me from the park and have me removed from the swarm call list.

Thankfully, I soon heard the constructive belly laughter and voice of my farm coach again. The pee-wee football game had reached halftime, and they had just turned on the towering lights over the ballfield. "Yall haven't got that swarm down yet?" Lowry asked. "All you gotta do is tie a rope around the limb and pull it down slowly so you can reach it."

"That's a good idea." I said. "Why didn't I think of that?"

"Well, what we gunna bend it down with?" Tightwood asked.

"Your truck." Lowry said. Lowry had been a former little league baseball coach and started buttering up the director with flattery like all coaches do before a ball game, enough so that director relented and let us try one last idea.

Fire in the Hole

Using several recently acquired basic farm skills, I lassoed the limb and tied the other end to the Tightwood's trailer hitch with a real work of art I entitled a triple-loop overhand farmer's knot. I gave Tightwood the thumbs-up signal in his rear-view mirror. As Tightwood tested the gas pedal, the rope straightened, and the limb slowly began its downward bend. Even the parks director seemed pleased with the progress. Standing ahead of the truck, he directed Tightwood's forward progress with crisp bicep-curl forearm motions. To be honest, I thought that was an excellent motion that I might add to my repertoire of farmer hand signals. Most farmers are not big fans of complex verbal communication and would rather convey thoughts and ideas through hand signals, head nods, grunts, and blinking Morse code. Many dialects of non-verbal communication have developed over the eons ever since the first nomadic couple decided to give up the rat-race of hunting and gathering and settle-down to feed the world. It is not uncommon, then, for farmer's non-verbal signals to be confused.

All this is to say, when the director heard Tightwood's truck backfire, which always happened two-minutes after cranking, the director switched from bicep curls to an excited jumping-jack signal. This had the effect of confusing Tightwood, who, befuddled, tap-danced on the pedals and then accidentally planted a foot on the gas. The limb lurched downward greatly, and the rope held long enough to produce a split-second of tire spin, just enough for the director to dive out of the way. Suddenly, though, I realized I forgot one of the loops in the triple-loop overhand farmer's knot, and I watched my knot easily unfurl itself to release the truck from its anchorage to the tree. With a rush of gasoline to the eight pistons, it sounded like Tightwood's truck had erupted and was launching itself into orbit.

In reality, that noise was a good sound effect for the

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launching of the bees. Elm being pliable and resistant to splitting, the limb catapulted forward. Amazingly, the ball of bees went sailing, end over end, into the luminescence of the towering lights and straight through the uprights onto the football field – a nearly 50-yard kick. As the swarm bounced down, all the nearby football players scattered and started flailing their hands upright beside their heads and helmets, clearly mimicking the sign for a good field goal.

Afterwards I quickly retrieved the bees from the football field, while one parent, delirious with joy, used a single-digit hand signal, the number one I believe, to indicate where he thought my miracle kick ranked in the annals of sport history. Even the parks director was greatly impressed. After he got done shrieking and blowing his whistle some more, I heard him conversing with the 911 dispatcher about my successful major league debut. However, not one to let limelight get to my head, I quickly fled the field and later changed my name.

Being a gracious coach, Lowry refused to take any responsibility for the play call and gave me all the credit for its successful execution. He then officially bestowed upon me the great honor, Captain of the Swarm Team.

BC

Stephen Bishop writes humor and keeps bees in Shelby, NC. You can see more of his work at **www.misfitfarmer.com**

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Varroa Resistance

Is It Really Possible?

Terry **Combs**

Bee Culture readers and subscribers;

For many years I have appreciated the sage advice, information and occasional opinions your new Editor has given as the *American Bee Journal* Classroom editor and writer. My first Classroom exchange with Jerry concerned the honey harvesting rules that were in place in my home state. His answer helped initiate a change in a state regulation. We also had a cooperative exchange over the loss of the best beekeeping instructional program we once had: the Boy Scout Beekeeping merit badge (My first intro to beekeeping). Unfortunately, neither we, nor the numerous others who tried to get it reinstated, were successful. However, there is at least one beekeeping issue where we have differed in solutions: solving the *Varroa* problem. That problem, and its solution, has divided the beekeeping community to the point that we now have beekeepers engaging in totally opposite paths and every possibility in between.

One of the last *ABJ Classroom* questions posed to Jerry concerned the feasibility of breeding honey bees for resistance to *Varroa*. After sending Jerry my response, he invited me to share it here in the pages of *Bee Culture* as an article. I've had several communications with Jerry on the subject of *Varroa* resistance/tolerance, chemical avoidance, honey bee survivability and considering bees as "pets". In my response I put an explanation of why I'm so eager to respond on these issues. The why? Is best answered with the words of O. W. Park in December 1935 at the 48th annual meeting of the American Association of Economic Entomologists held in St. Louis, MO. [**1**] Oscar read his paper titled *"Testing for Resistance to American Foulbrood in Honeybees."* Three sentences from Park's paper best convey my thoughts and feelings and although Park was talking about AFB these sentences pertain just as much to Varroa:

"***But claims regarding resistance have recurred so persistently that they can no longer be ignored. Either there is truth in these claims or there is not. The matter is too vitally important to the beekeeping industry to permit a continuation of the present status of uncertainty***."

As to what prompted me to reply to Jerry, it was a quote attributed to Canadian bee breeder Tibor Szabo: "trying to breed honey bees resistant to *Varroa* is like trying to breed sheep resistant to wolves". I remembered reading words very similar that originated from Friedrich Ruttner; Professor of Zoology at Frankfurt University and head of the Institute for Bee Science in Oberursel. An understudy of Ruttner's, John Kefuss, had told Ruttner that he had decided chemical treatments for *Varroa* were futile and damaging to the bees. Kefuss was more interested in natural bee resistance to *Varroa*. "Using chemicals is caveman beekeeping"

Kefuss stated. To which Ruttner replied that bees couldn't be bred for resistance to *Varroa* any more than sheep could be bred for resistance to wolves. But the story does not end there. Kefuss, along with German entomologist Wolfgang Ritter, found Varroa resistant bees in the apiaries of Tunisian beekeepers that were too poor to use chemical treatments thus allowing natural selection to bring about a balanced host-parasite relationship conferring resistance/tolerance to *Varroa* in their bees. After studying and working with the Tunisian bees Kefuss stated, in 1996, that "we knew we could select for *Varroa* resistance." Ruttner's last comment on the subject was "it turns out that sheep can be bred against wolves." As to whether this is resistance, tolerance or some other mechanism, Kefuss also addressed that; "It's not important to know just why a particular strain is surviving." {**2, 3**] Why not? Because as numerous researchers have already shown; bees that develop natural resistance/tolerance to *Varroa* utilize different resistance mechanisms, or combinations of mechanisms, in different locations, sometimes even having different mechanisms between apiaries within the same general locale. [**4, 5**] To date there is no one universal resistance mechanism used by bees which resist/tolerate/survive with Varroa. Thus the reason that bees bred for only one enhanced trait/behavior/mechanism have not completely solved the *Varroa* problem. The utilization of different mechanisms in different locations is part of the reason why queens/bees reared in foreign locales do not solve the Varroa problem in a different environment even if showing resistance in their original locale. [**6**] However, there is recent research showing that a social immunity mechanism which appears to suppress mite reproduction; the uncapping and recapping of worker brood, has recently evolved in four separate mite surviving honey bee populations.[**7**]It remains to be shown that this mechanism is at work in other mite-surviving populations.

Numerous researchers have now studied and documented world-wide populations of honey bees that are surviving both Varroa and their associated viruses. [**4, 5, 8, 9**] (The Arnot Forest bees are a unique totally feral population.) So have many beekeepers, with myself among their numbers. For those who think this requires immense effort and centuries or millennia of time to come about; you are mistaken/misled. Current views from the

field of evolutionary biology are that natural adaptive changes can come about rapidly between hosts and parasites especially in circumstances where hosts are suddenly confronted with a new novel parasite as has happened with *Varroa destuctor* and *Apis mellifera*:

"A second source of evolutionary creativity is the speed at which natural selection can act. Selection does not need geological time, spanning thousands or millions of years, to transform species." [**10**, P. 84] "The picture emerging of natural selection at the level of the individual, whether or not it is enhanced by species selection, is one of exuberance, power, and a potential for quickness. If enough raw hereditary material exists in the first place, and if the selection pressure (differences in survival and reproduction) are strong, one gene or chromosome can be substituted for another in fewer than a hundred generations" (20 generations = 1year for fruit flies) [**10**. P. 85] "The possibility is there for rapid microevolution and even the early stages of macroevolution. The capacity is well understood in theory and has been realized in laboratory experience. It is also displayed in wild populations **when species are subjected to new selection pressures, such as the threat from a new parasite** or access to a new food source." (I added the emphasis) Wilson finishes by stating that the other big influence in adaption and evolution is the local ecology. [**10**, P. 92-93]

This ability to rapidly co-evolve with *Varroa* I have seen since dispensing with chemicals and allowing my bees to create their own maternal line. Yearly colony losses have gone from 83% in 1996 to less than 5% in the past few years, with 3 of the last 5 years having no losses.[**11**] Bees showing DWV damage have also become a thing of the past in my apiary since spiking about 15 years ago. In addition, apicultural researchers also confirm that a rapid co-evolution is occurring between *Apis mellifera* and *Varroa destructor*. [**7, 12**] I submit that honey bees are confirming this ability of lifeforms to quickly adapt to new parasites that Wilson and other evolutionary biologists have proposed.

Another concern raised in the Classroom letter regarding breeding bees for resistance to *Varroa* was the difficulty in bringing this about. I agree that using many of the current beekeeping practices which interfere with natural selection make achieving this goal difficult if not impossible. However, for those willing to make the necessary changes, bringing about *Varroa* tolerance/resistance is not that difficult. After dispensing with chemical treatments and starting a maternal line of survivors I began a program consisting of record-keeping, testing, selection, and culling of queens in line with breeding programs used by aquarists and other breeders of pets and livestock in order to help my bees come to a host-parasite relationship with *Varroa*. I now feel a much simpler approach, consisting of the propagation of my best maternal survivor colonies, could have achieved the same results. A recent research paper from Seeley et al. lends support to my thoughts:

"if a closed population of honey bee colonies is allowed to live naturally, it will develop a balanced relationship with its agents of disease." [**13**]

With beekeeper cooperation this relationship could come about quicker and possibly more effectively. In addition they will adapt to their own local environment. Seeley et al. also offers four suggestions to help bring this about:

1. No chemical mite-control treatments.
2. No crowding of colonies within apiaries.
3. No maintaining of unnaturally large colonies in an effort to squeeze out every drop of honey possible and avoid swarming.
4. No movement of colonies out of their local environment.

I would add a 5th suggestion; No foreign bees or queens should be brought into the apiary-a maternal line of survivor queens must develop for natural selection to be allowed to act on and produce survivors. Replacing your queens with new foreign queens every year will not bring this about no matter what traits they may have been selected for and enhanced to combat Varroa. The resistant/tolerant surviving populations documented by Locke and others have been subjected to no elaborate or lengthy selection/breeding schemes. Many of these survivor populations have been less intensely managed, but many beekeepers over-manage their colonies, often to their detriment. Some honey production may initially be sacrificed, but there is also research showing resistant survivors to be more productive than nearby susceptible colonies. [**14**] During my selection process I favored the better honey producing colonies and have had no problems obtaining both a honey crop and ensuring enough capped honey for Winter stores. Honey production is easy to select for if needing improvement once bees are allowed to work out their co-evolution with *Varroa*. There may be less profit initially, but there are also beekeepers who are not interested in profit. Beekeepers who value profit over the health and survivability of their bees fall short of being beekeepers in my opinion. Ensuring a healthy future for all life on this planet is more important than the money in my pocket. One consideration for those with business concerns about the bottom line; I've not bought replacement queens/bees or used chemical treatments/gadgets for 24 years-how much money would that have saved you?

I am perfectly happy with my colony's health, size and production. 2020 marks 24 years of maternal line survivorship without chemicals or foreign

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replacement queens. I cannot agree with those saying this can't be done. As Wilson has pointed out; insects have survived some of the 5 great extinction events in our planet's history.[**10**, P.27, 30] From solitary wasp-like ancestors they have become eusocial insects capable of behaviors that allow them "imitable architectural powers" as Darwin put it.[**15**] They have found defense mechanisms for the Giant Asian Hornet and other pests. The original host for *Varroa*, *Apis ceranae*, has evolved to co-exist with Varroa. I see no reason why *A. mellifera* would be unable to co-evolve, defend and survive against a blind, helpless mite. As to large commercial beekeeping operations; Danny Weaver has shown they can also achieve this host-parasite equilibrium in their bees. It all hinges around how serious we are about finding a sustainable long-term solution.

The idea that many have to try and eradicate *Varroa* is a flawed one-they are now here to stay, they are one of the permanent residents in the hive.[**16** P.54] This idea of eradicating other forms of life whether it be *Varroa*, yellow jackets, viruses or anything else is dangerous because, as one of the main points of Wilson's book shows; all life has value. A good example of this is found in one of humanity's scourges; viruses. Cold viruses and herpes viruses are now a new frontier in treating another scourge: cancer. [**17, 18, 19**] There are solutions to *Varroa* and other problems if we only take the time to find them. In the long term they may prove easier and more profitable.

Finally, readers will notice that I have referenced various research papers, books and articles. Can research be subverted? Can it be wrong? Yes to both questions. However, when multiple established and well-respected researchers, especially under different circumstances from around the world, come up with the same findings; it is time to sit up, take notice and be ready for action. Research papers are not that hard to read with a little practice and I find them more informative than the "advice/info" given by many of the 3rd year beekeeping "experts" paraded before me in my 54 years of beekeeping. What the beekeeping community currently needs are answers to initiate action in order to solve the *Varroa* problem; we've kicked the can down the road long enough [**16** P.218], and the answers are "**too vitally important to the beekeeping industry to permit a continuation of the present status of uncertainty."**[**1**]

BC

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Overwintering Nucs

David **MacFawn**

Colony management throughout the year is critical for colony success and overwintering Nucleus Colonies (NUCs) can be a viable management method in the southeastern United States. NUCs are typically five deep frames of bees in a five-frame box. An alternative to five-frame NUCs is eight-frame or 10-frame boxes/equipment.

Five-frame NUCs can be stacked on top of one another to allow more space to avoid swarming. Bees tend to move up and stacking five frame NUCs allows this. Also, in the wild, bees tend to have five to eight combs. Care should be taken to avoid five-frame NUCs from tipping over. It should be noted five-frame NUCs swarm easier than either eight- or ten-frame equipment. It is typically easier to find the queen in a five-frame NUC than either eight-frames or ten-frame equipment.

Five-Frame NUC. Photo courtesy David MacFawn

Fig. 2 Eight-Frame Hive. Photo courtesy: David MacFawn

In the southeastern United States (I live in South Carolina and this is predicated on my location), colonies often build up and prepare to swarm as early as the end of February. Queens are not available at the end of February. Hence, it is recommended to requeen the previous Autumn so the colony will have a young vigorous queen the following year. If you hear the phrase "overwintered queens," you need to ask if the colony was requeened the previous Autumn. This will minimize swarming and possible queen failure in the Spring.

Splits in South Carolina may be made as early as the end of February and into March. Swarm cells may be used in this time frame if available or a "walk-away" split made.

A walk-away split is where a colony is split and the half without a queen raises a queen itself from larvae typically less than three days old. A frame of eggs with less than three-day-old larvae, a frame of pollen, and at least one frame of honey should be placed in the split.

You want to take the bees on the frames and place them into the split; do not shake them off. The presence of a laying queen should be made in the split after four to five weeks. If you go into the split and they are "noisy" before four to five weeks, you may want to consider placing an additional frame of eggs/larvae in the split. If they pull-out a queen cell, something happened and a queen was not raised. The split should be fed 1:1 syrup, even during a nectar flow for insurance, especially during those rainy or cool days.

If the swarming urge can be held off until later in March, mated queens are often available. This may be accomplished by removing a frame of brood and making up a five-frame NUC from several colonies. The bees will readily accept each other when brood frames from several colonies are combined.

It is considered best practice to use a five-frame NUC when splitting rather than eight frames or ten-frame equipment since the bees seem to do better. They can maintain their nest temperature easier than in larger equipment. The split should be fed 1:1 syrup in the Spring. Pollen is generally available after around February 1st in South Carolina when the maple trees bloom.

Bee development times are critical. It takes about 16 days total for a queen to emerge, another 10 to 14 days for her to mate and start laying, and about 21 days for workers to emerge. This is a total of 47 to 51 days or 6 to 7.25 weeks. If a walk-away split is made March 1, this means workers will not emerge until mid-April with the nectar flow starting around April 1. It normally takes around three weeks for a newly emerged worker to become a forager, which means you will not get foragers until the second week in May. The nectar flow in the Midstate of South Carolina is typically over around June 1. This means you may have to feed a walk-away split during the following Summer dearth of nectar plants and Winter to keep it alive.

It is usually better to use a local mated queen. You can reduce the worker emerging time by three to four weeks. If you obtain a local mated queen at the end of March, this means the first workers will emerge about the third week in April. The resulting field bees will start working mid-May, which means you still may have to feed the following Summer, Fall, and Winter. However, a local mated queen used when splitting in the first half of June results in a fully functioning colony mid-July when the cotton blooms. A local mated queen used in August also means an earlier functioning colony in the Autumn.

In South Carolina, splits can be also made in June, after the Spring nectar flow is over, or in August. Splitting in June works well since the colony has a lot of bees and it results in a brood break to help control *Varroa*. When splitting in June, it is better to put the colonies on another nectar flow after the split to help them draw the comb out. If splitting in August, it is best to have drawn comb. Splits should typically not be done later than August to allow the queen time to start laying and build up the colony worker numbers of Winter bees before cooler

weather in November. Not later than August also allows the bees to get their nest organized for Winter. Feeding should start no later than mid-September which is when the bees typically store the 2:1 sugar syrup strategically around the nest.

It should be noted that you need fully drawn comb going into Winter. This allows the bees' cell space room for honey or syrup storage and colony expansion in late Winter and Spring. The Autumns in South Carolina do not typically have a strong enough nectar flow for the colonies to draw-out comb. Seven to eight frames of bees are required as a minimum number of bees in South Carolina to get through the Winter. The colony also needs four to five deep frames of "honey." Honey in the brood chamber and a feed chamber super works best. It is better to feed in the Autumn and ensure enough Winter stores to last until the nectar flow starts the first of April in the Midstate area of South Carolina. Feeding in the Spring, while it may be necessary to keep the colony alive, may cause swarming. Also, once you start feeding in the Winter or early Spring, you need to keep feeding until the Spring nectar flow starts or the colony may starve.

The wax moths will leave white honey super wax alone since they are after the impurities/proteins in dark wax that has had brood raised in it. Honey supers can be stacked at 90° to one another to allow light and air into the supers. Dark brood chamber wax can be stored in warm weather (greater than around 64°F. at night) on top of a strong colony that can patrol the extra comb space, stored in a freezer, or use PDB (Para Dichloro Benzene) crystals to keep the wax moths at bay. In South Carolina, wax moths are not typically an issue until June through September due to the temperature and humidity.

Winter wrapping of colonies is usually not required since it rarely gets into the lower 20s°F. The entrance reducer should be put on the smallest hole.

Two five-frame stacked NUCs can be separated and the total 10 frames are placed in 10-frame equipment in the Spring. This should not be done until warmer weather due to the brood nest disruption. The unstacking and placement in 10-frame equipment will help control swarming, assist with honey production, and reduce high stacking of more unstable five-frame NUCs.

Five-frame NUCs can be used effectively and overwintered well in the Midstate South Carolina area. Care and a well-thought-out plan should be made when splitting; wax moth management and temperature need to be considered for your successful split. Fully drawn comb is critical and golden, especially when going into the Autumn. If a walk-away split is made, the bee timeline needs to be examined to determine the progress of the split. A colony can be successfully split up to three different times through the year in South Carolina under the right conditions.

BC

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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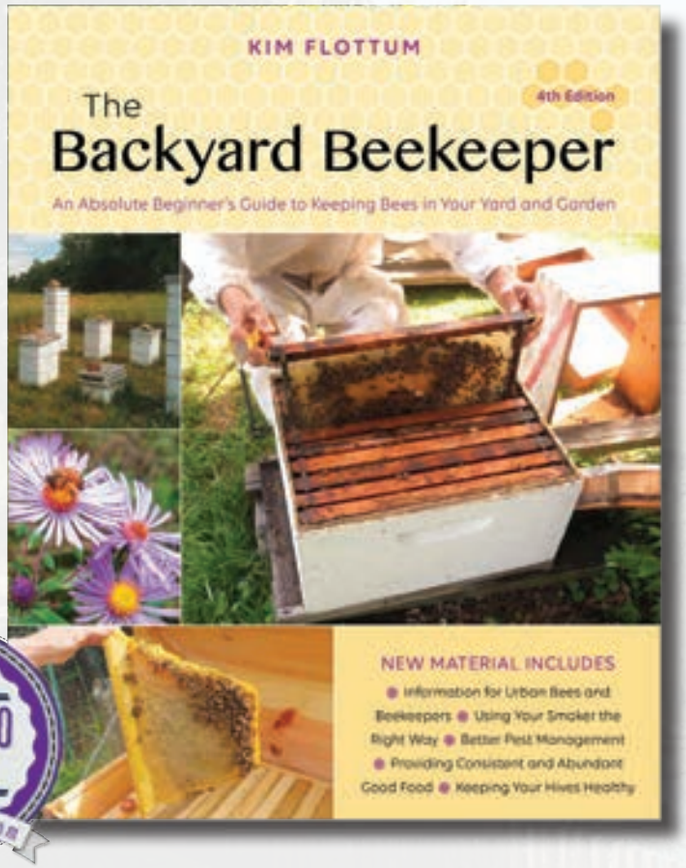

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Against The Grain

Appreciation For Pollen

Dr. Christine **Bertz**

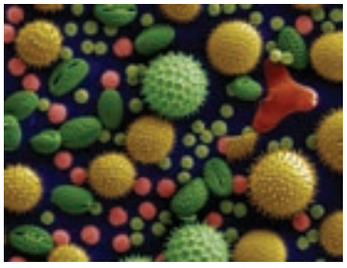
A grain of pollen is an amazing thing.

We don't usually regard pollen with awe. After all, on the surface, pollen's function appears mainly to be turning our cars yellow and our eyes red. People with a fondness for bees are more likely to appreciate pollen than most, since the honey bee relies on it almost exclusively as a source of protein. But pollen is even more complex than its role as a critical food source for our favorite insect suggests. A single grain of pollen is a self-contained, mobile manufacturing and shipping center, carrying all the materials necessary to fertilize a flower packaged compactly into an armor-plated, custom-designed vehicle.

In less fanciful terms, a grain of pollen is composed of two or three specialized reproductive cells inside a tough outer shell. (This coating is so strong that pollen is frequently preserved in the fossil record, particularly in lake sediments, and can provide valuable information about the climate in which its parent plant existed.) To produce a seed, pollen must travel from the male part of one flower to the female part of another, a journey that takes one of several forms: Some plants are wind- or water-pollinated, while others are carried by animals – including, of course, honey bees and other insects. Although not all grains of pollen reach their intended destination, they are constructed to optimize their chances of doing so. As a result, pollen from different plant species varies not just in color, but in size, shape, texture, and nutritional content, depending largely on how it is dispersed.

By Jessie Eastland - Own work, CC BY-SA 4.0, **https://commons.wikimedia.org/w/index.php?curid=58944849**

For example, wind-pollinated plants produce massive amounts of pollen that must be carried by air currents. To spread as far and widely as possible, pollen grains from these plants tend to be small and light -- even by the standards of pollen, already microscopic in size. Some wind-pollinated plants produce pollen containing balloon-like pockets of air to increase their buoyancy, while others make pollen with wing-shaped outer shells to catch the wind like a kite. However, to remain lightweight, this type of pollen doesn't include many large, heavy molecules like proteins, so pollen grains from wind-pollinated plants are of little nutritional value to bees. Honey bees generally only deign to collect this type of pollen when other pickings are slim.



Pollen in various shapes and sizes **https://commons.wikimedia.org/wiki/File:Misc_pollen_colorized.jpg**

Insect-pollinated plants, by contrast, produce larger grains of pollen with a sticky or spiky outer shell. These pollen grains can easily cling to the tiny hairs on a pollinator's body to hitch a ride from flower to flower, and pack neatly for transport on the hind legs of honey bees. From a beekeeper's perspective, these larger grains of pollen are the first to be excluded during honey filtration, so mesh size is an important choice for beekeepers wishing to preserve the pollen content of their honey during processing. Pollen grains carried by insects are also relatively heavy, packed with nutritional content in the form of proteins, carbohydrates, lipids, minerals, and vitamins. Many insects are specialized to feed on pollen alone, so access to a variety of plants with pollen high in nutrient content is important for their health and survival. Honey bees are among these palynivores... but although we often say that honey bees are also herbivores, this may not be correct: As small as they are, pollen grains are colonized in turn by even smaller microorganisms – tiny fungi and bacteria that recent research has shown could be a critical component of a bee's diet.

Mark Twyning / Marktee1 at en. wikipedia

The good news for pollinator stewards who also want an attractive yard is that insect-pollinated plants must advertise the presence of their nectar and pollen with beautiful flowers. However, not all flowers are nutritionally equal: In addition to differences in pollen composition from species to species, some cultivated varieties of plants are bred to be sterile, and may not produce pollen at all. Others, such as double-flowered plants, have been selected to produce blooms that are so ornate that bees can't reach the pollen within. Unfortunately, information on floral pollen quality can be difficult to unearth -- but if a web search fails, then experts at a local nursery may have the right tools.

And expertise is certainly warranted. For such a tiny structure, pollen is enormously complex. It is a specialized vehicle for plant reproduction, traveling from place to place in many ways. Its variety impacts the health and foraging habits of pollinators. And it hosts its own diverse, mysterious microbiome, which we are only just beginning to explore. We can't always control the pollen sources in our vicinity as much as we'd like -- especially during ragweed season -- but we can choose pollen-producing plants for our yard that help supply honey bees and other pollinators with a diet that meets their nutritional needs. And since insect-pollinated plants are less likely to trigger our allergies, they make it a little bit easier to appreciate that the complexity of a grain of pollen is nothing to sneeze at. BC

We'll Meet Again - Online!

Charlotte **Ekker Wiggins**

When was the last time your bee club met in person. It's been six months for our local bee club, with little prospect that we will be back sharing a cup of coffee any time soon. There is a workable alternative and that is to meet on-line, a daunting thought to the technologically unfamiliar but quite doable. If you already have an organized bee club, you will continue to do the same things you've always done except organize, and deliver, the information on-line.

As much as we may miss seeing each other in a group setting, the on-line meetings are actually easier to run. Everyone is working from their respective offices and homes instead of spending hours setting up meeting rooms. The pre-meeting organizing sessions can also be easily held on-line, providing an opportunity to "train" on how different on-line platforms operate.

By this point in COVID 19, most of us have heard of Zoom, the on line meeting platform used by many to connect. There are a few others you can try, depending on how many club members you have and your club budget:

- FreeConferenceCall.com. Donation-based, focused on serving students and non-profits, they include suggested donation amounts.
- GotoMeeting.com $12/month for 150 participants.
- Skype.com. Free meetings up to 50 participants; recordings that last 30 days.
- Zoom.com Free for 40-minute meetings; $150/yr for up to 100 participants. There may be a $30 discount coupon for a yearlong subscription.

Getting Ready to Meet On-line

Running an on-line meeting requires pre-meeting planning and practice. If you've never run an on-line meeting, plan for 1-2 practice sessions so everyone becomes familiar will all of the available functions. Knowing where the mute button is and how to bring someone into the meeting are important to a good experience for everyone.

- Set up the computer camera so that it is straight on or a little higher than where you are when you're sitting. You want to be talking to people, not down or up at them.
- Use natural lighting when possible. When meeting evenings, use lights in front and around your face, not to the side or behind you or you will become a shadow.
- Check the visual and audio backgrounds to make sure it is not too busy or distracting. Turn off any machines; dehumidifiers and such during your meeting, your microphone will amplify the sound they make. You may not realize it but participants may not be able to hear you or may be highly distracted.

Practice Meeting On-line

If you haven't managed an on-line meeting before, have a dress rehearsal with meeting assistants so you all are familiar with how the service works.

It's helpful to have several people focused on particular aspects of running an on-line meeting;

1. Help with meeting log-in
2. Tech support during the meeting

Here's another good use of those wonderful beekeeping books, pile them up to raise your laptop and computer so you are sitting eye level with other on-line participants.

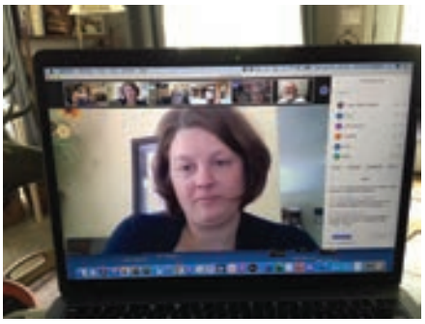
3. Chat room monitoring
4. Timekeeper
5. Plus who will be moderating and who will be making presentations and on what topics.

The first time our local bee club had an on-line meeting some participants had issues signing on. We used texting as our backup to guide them as they signed on.

Prepare for Your On-line Meeting

To have an effective on-line meeting it helps to be organized and share information with participants prior to the meeting.

- Share an agenda a week prior to the meeting with background information so everyone knows what to expect and what roles they play.
- Keep on-line business meetings to a maximum of an hour if at all possible.



Rolla Bee Club's Lorri Thurman monitors the on-line chat room during our July 26, 2020 on-line bee club meeting.

- Take a 10-minute break if going longer.

Allow for an informal conversational time for participants to share and ask questions.

You're Now Meeting On-line

Whoever is running the meeting should be focused on this particular meeting. Turn off all computer notifications and close all other computer programs. This will improve bandwidth and ensure the smoothest audio and video transmissions.

To open the call, ask everyone to use the chat box to say hello. It is a good way to get people focused and comfortable with technology.

Request that all board members use and turn on their video camera (if they have one), so everyone can be seen and heard during the meeting.

If people sound wonky, have them turn off their video and just use audio.

Let participants know that the board chair will recognize them before speaking to avoid everyone talking at once.

Ask everyone to use their mute button when they're not speaking to silence background noises from kids, pets and others working at home.

Consider using the chat box, poll and quiz functions to enhance the efficiency of your meeting:

Use the chat box to ask for a motion, second and other brief responses.

Use a poll for yes/no questions and asking for feedback on proposed actions, such as "What suggestions do you have to improve future on-line meetings?"

When using slides, use simple slides to advance your meeting agenda and highlight key data points. Use transition slides to keep attendees on track. Don't fill slides with text; just show the key points.

Rolla Bee Club's David Draker July 26, 2020 discussing online how to feed nucs from his desktop computer in his basement workshop. Some participants were visible, others were just listening to audio. (Photos by Charlotte Ekker Wiggins)

Allow extra time for questions throughout the meeting. People may need more time to process the information being shared, and it will take longer to hear and respond to questions.

Finally, provide a written record of the meeting in addition to post-meeting access to a meeting recording for those who missed the meeting.

BC

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Charlotte Ekker Wiggins is the author of how to start a bee club guide "*Bee Club Basics*," available at **Bluebird Gardens.com** and Amazon. She is also founder of an educational non-profit bee club **Rollabeeclub.com** and lectures on running clubs and planting for pollinators. **CharlotteEkkerWiggins.com.**

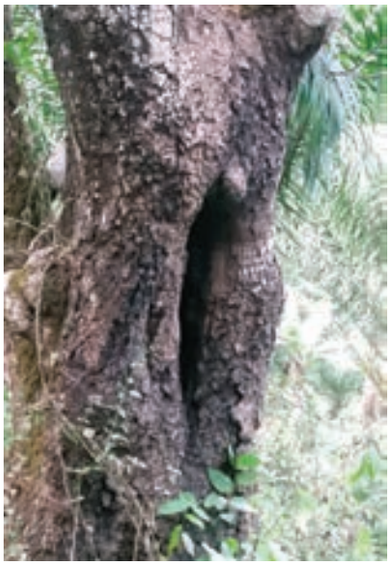
EBOLA, COVID-19 AND BEEKEEPERS

Richard **Godfrey**

In December of 2916 I left my family and beehives to head for Sierra Leone, West Africa. The Ebola virus was spiraling out of control with a mortality rate of 45% and government fearing a million deaths if it was not contained. Sierra Leone only had a few hundred doctors and out of twelve that had become infected only two survived. There were also few nurses, and as a surgeon trained in infectious disease I hoped to make a difference. Serving with International Medical Corps, our team staffed Ebola Treatment Units (ETU) in large tents that looked like concentration camps. We dressed in Personal Protection Equipment (PPE), trained fast, tested and isolated patients with Ebola, and hoped they would survive. Outside a small town called Lunsar in the Port Lobo region, men, women, and children arrived with fevers, cough, and headaches. When things went well they might outlive the virus and get discharged after testing negative. If not, usually in 4-5 days, we carried them to a very full morgue.

As physicians we were concerned as a majority of patients developed coughing. We also experienced so called "chlorine coughs". Each shift we were washed and sprayed down with 0.5% chlorine solution as we un-doffed our personal protection equipment. Even in protective gear and N 95 masks we inhaled the chlorine and the pharmacy carried no cough medicine for patients or for us.

What to do? Since three doctors on the medical team were beekeepers we went searching the marketplace for local honey. Even more to our interest, however, was to find someone who would be the collector of an age proven remedy for sore throats and cough. Bingo! In the village next to our ETU was Abdul the beekeeper. This thin, lanky, thirty-something year old was also known as UB40. The band post-dated my musical knowledge and UB40 spoke mostly Temne, so there were a few miscommunications. But soon it was a Saturday Night Live event in Ebola land.



In the dark, thirty interested villagers, a few flashlights, UB40, three doctors, and as many dogs trekked no more than a quarter mile to the bee sanctuary - a large Mango tree with a cavity opening accommodating the local bee colony.

In the darkness UB40 reached deep into the arboreal center, hoping to pull out a prize. He was disappointed. Harvesting season is March and April, at the end of the dry season, but despite the lack of a good honey flow he was determined not to disappoint his audience. Abdul hastily grabbed an axe and took aim at the back of the tree and chopped with all his strength. He chopped for half an hour, then was assisted by two rested companions, and chips flew out like small flash -lighted missiles. We dodged and backed away along with the dogs. After almost an hour they cut through 6 inches of trunk and finally UB40's long arm reached in deep for the prize. Bonanza! From the interior came thick comb dripping honey and brood, enough to fill a bucket. The bees came as well, but they were calmed down by the flames and smoke from palm fronds. Our entourage filed back through the dirt path between huts and tin roofed dwellings, beneath a star filled sky – for the village it was as good as any rock concert.

Dark, aromatic honey of Sierra Leone sells for a few dollars a pint in local markets and twice as much in city supermarkets. A few NGOs work on business models for bee keeping, such as Siegfried Woldhek's Netherlands funded operation that focuses on community-based resources and employment in the Pujehen District. Their hives are built in the village and the new beekeepers work in stages, first learning biology and basics, and later business strategy. Pastor John Kumara leads the Musaia Beekeeping group in Koinadugu, further south, and each member is taught to protect hives and use smoking techniques that don't require destroying hives as early hunting/foraging techniques once did. Ruffia reed log hives are built and suspended in trees and a gender-based assignment of duties defines the harvesting techniques. Men climb the trees to harvest, and women "pull" the honey to sell and to use. It may seem like little has changed from say a thousand years ago, but then again, no one complains of CCD.

I searched in vane the literature on the different bee species of Sierra Leone. After several weeks it seemed like the University of Google might lose its accreditation because there just isn't much reported on. We encountered two distinct species. First was the colony of small dark bees in the Mango tree - a supposed *Apis Mellifera Adonsonii*. Taxonomists may confuse them with *Apis Mellifera Scutellata*, but they exhibited behaviors during our night outings that had nothing like the defensiveness of the "Africanized honey bee". The scutellata bees I work with in East Africa will chase you for a mile and make sure you respect them. We also saw some bees that made *Apis Mellifera Cerana* look like dwarfs (these large bees or wasps landed in the Chlorine water pools that we used to sterilize our boots when walking out of Ebola wards). I searched the taxonomy charts and images to find a similar looking bee, with a prodigious body around 2 cm long. Go figure, maybe there awaits a discovery of a bee species to be named UB42!

The West Africa Ebola crisis burned out after a few months. It was the 25th outbreak of the virus and another

one festers away in the Democratic Republic of the Congo. Here in America we are dealing with the pandemic outbreak of Covid 19, another Zoonotic virus that seems to have originated from Bats. Based on the patterns from China it is hoped that the virus will be active for not too much more than 3 – 4 months if properly suppressed. But that's still a hope.

On a more serious note, after months of working to contain Ebola and take care of patients with a devastating and rapidly fatal outcome, the outbreak is nearly controlled. The local population, however, is tremendously set back and will need years just to return to a sustainable economy. Agriculture is the primary work in the rural area, with rice, cassava, and vegetables as the primary food source. Honey production would be very useful, supplying both food and medicinal benefits. We have begun a small project trying to enhance the honey collection in the western area of Sierra Leone by working with Abdul. We had the local carpenter build a small catching box, roughly half the size of a Kenya Top

The swarm season is just beginning in Sierra Leone, and hopefully Abdul is sparing the local trees of his axe and harvesting honey from the portable box. I've long since lost touch with a man who is happy to work with a minimum of gear as long his portable radio sings out "Can't Help Falling In Love" and "Red Red Wine".

Bar Hive, that may be hanging from a site about twenty yards from the colony in the Mango tree.

The strategy for Covid 19 in the California Bay Area learned from the lessons of Ebola and went beyond. First isolate and quarantine all infected persons, and second implement social distancing. While social distancing was introduced very late in Sierra Leone, it hopefully will suppress the outbreak sufficiently that lives are saved and the economy is not completely undermined. Meanwhile

the Alameda Bee Keepers club manages about 600 swarms each season and the most active time of the year synchronized with the arrival of Covid 19 to California. We established guidelines, practicing social distancing and preventive hygiene during March and April. Swarms have been captured mostly by experienced beekeepers that can work alone. The work ethic is to protect the public, the beekeepers, and the bees. As with the Corona virus, we are learning more from Mother Nature every day!

The guidelines recommended in the club include the following –

1. If a swarm is announced it can be assigned to only one individual. If it requires experience as determined by the swarm list team, then newbies cannot take the call. The decision of who goes should be up to the swarm list team so that long email chains and arguments don't divide us as common beekeepers and club members.
2. No one should go for a swarm who has had symptoms (including fever, cough, malaise) or been in contact with others with symptoms.
3. If you have any doubt or question, regardless of age, of your immune system, please stay at home.
4. Explain to the public when they ask for swarm management that our club honors social distancing and no one can come close to you while working. Also be sure that no one has been diagnosed in the home or is ill.
5. Retrieving a swarm in public and private areas requires protective gear – latex or non-latex gloves when not wearing bee handling gloves. Please wash all clothes before and after swarm capturing. They may need it anyway. Wipe down gear before and after going on a run. Use a mask while outside your car, preferably N 95 or N 99 (few if any are available), but at least a mask that shows the public that you are observing precautions while working. Wash hands often, soap and water, to protect yourselves and others. Don't rub your face unless you want to be stung by a bee or a Covid particle.
6. If you are involved in a swarm capturing process that requires two people for safety then proceed as needed outside of Club recommendations and with your personal good judgment. The club is not a State, County of City authority. We just try to serve the public and protect bees.
7. If some individuals feel that catching a swarm during the endemic is contraindicated, it is hoped they can provide factual reasons to persuade the club to change policy. Please communicate through Google-Group and not the Swarm line. The value of managing swarms safely during endemic virus days has many positive points that can be debated for months and years to come. Our rules should balance with Mother Nature, who always has a lot to say!

BC

CATCH THE BUZZ

Bee Culture Magazine comes out once a month, but news and information is constant. To get you the very latest information from the world of beekeeping and all the things we touch as fast as possible, Catch The Buzz came to be. We routinely post articles of interest, news releases and other informational bits and pieces that never make it to the magazine. Maybe not daily but at least a couple times a week. If you'd like to automatically receive these FREE POSTINGS via email, sign up at **https://www.beeculture.com/catch-buzz/**

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Up Close With A Northern California Beekeeper

Ettamarie **Peterson**

Jennifer Robin Berry, a Northern California beekeeper based in Sausalito can best be described as a Renaissance woman. She combines her talents of being a biologist, artist, inventor and beekeeper in her bee breeding business Jennifer Berry Bees (**jennifer-berrybees.com**). She became interested in insects when she was about five years old. She gives credit to her mother, a librarian at the time, for supplying her with a lot of books on insects after she had been frightened by a swarm of termites at a younger age. In 2003 she was introduced to bees by a beekeeper who is still an important part of her regular beekeeping work in Healdsburg, California.

Jennifer Robin Berry by her mating nucs at one of her apiaries in Sausalito, California. Photo by Ettamarie Peterson

Jennifer graduated from Northern Michigan University with a unique Bachelor of Science degree combining science and writing. She has a business background in landscape and resource management that used her knowledge of biology. She was involved in green building design, permitting and biological assessment. It is interesting how this all contributes to her beekeeping and bee breeding techniques. She looks at the problems of hive management, weather and climate changes and areas to use at her apiaries with different eyes than many beekeepers.

Most of Jennifer's apiaries are in Marin County just North of the Golden Gate Bridge near the Pacific Ocean. If you have ever been to San Francisco you will know what that weather pattern is like. The Winters are on the mild side with early blooming trees such as the eucalyptus providing nutrition for the colonies. The Summer winds can bring cold, damp air in from the ocean. One of her apiaries is particularly foggy. She wraps some hives in a thin padded foil packing material to help them thermoregulate. Interestingly the mild Winters inspired her to start her queen rearing much earlier in the year than most people. Her belief is that the drones available to mate with her early Spring queens are superior as they are Winter survivors. The mild Winters do pose a problem by not causing a break in brood rearing thus allowing the mites to reproduce more. Because Jennifer is a scientist she does not ignore the weather patterns and frequently checks a weather blog called Weather West. She says it is quite helpful in planning her queen rearing. You can find this blog through Facebook.

Jennifer has an interest in honey bee genetics and focuses on mite resistance, allogrooming where good hygienic bees solicit hive mates to groom mites off them and mite tolerance. She has used some of Marla Spivak's Minnesota Hygienic queens to add good genes into her own selected stock. She has kept detailed records for the last ten years. When she finds queens that meet her criteria and are worthy of keeping as breeders, she marks them with an orange dot. She is selling queens and nucleus colonies. She wants to improve the honey bees available in Marin County by working with a group of Marin County beekeepers interested in breeding and raising better queens. One technique of her record keeping is to keep important notes and observations on the lids of the various colonies. The very cleverly designed tool belt she wears around her waist while working with her bees includes marking pens for this and queen marking pens. While I was visiting her observing her do checks on mini-mating boxes, I watched her take out her blue queen marker, gently lift an unmarked queen, hold her between her fingers and quickly mark her as a 2020 queen. When I told her how I have always been afraid I would hurt one, she told me I should practice on drones.

Speaking of drones, Jennifer had the good fortune to discover the nearby drone congregation area while out watering an oak tree on a deceased friend's grave in the cemetery up the hill from that apiary. She heard the drones chasing the queen and actually got to see them in action. She is sorry she couldn't get her cell phone out quickly enough to take a photo! How many beekeepers have been lucky enough to find drone congregation areas? This is certainly on my bucket list!

Because Jennifer is also an artist she was selected by Autodesk to do a residency program at San Francisco's Pier 9 workshop. There she took in some two-inch squares of honey comb that became a work of art. She learned to do 3-D printing and constructed a fascinating project allowing the bees to work while she could make a time-lapse film. To learn more about her bee art project go to **https://www.instructables.com/id/B-Code-3D-printer/**

Check out the blog post that she wrote for the latest version **http://www.jennifer-berrybees.com/collaborations-with-bees**. It is absolutely fascinating and will make you respect the bees' comb building skills as well as Jennifer's creative mind. The process is very complicated and may take you a few times reading it to even begin to understand.

Feeder box Jennifer Robin Berry created with her 3-D printer. It will serve the two small colonies that share the starter nuc. Photo by Ettamarie Peterson

⇨

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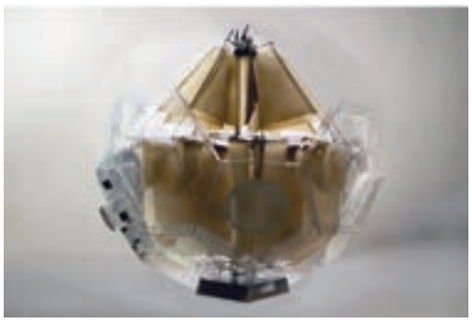
The tube is designed to use to fill the feeder box. A float fits around it to prevent drowning.

She now has her own 3-D printer and is using it to create a feeder/division board/small hive beetle trap combination that fits into her growing boxes. Her engineering skills are being used to design a very practical item that will make life better for the bees. The growing boxes she uses are from Mann Lake. Two can fit over a standard size Langstroth box. Each nuc has two sections separated by the feeders. She likes the way the tops are hinged in the middle so she can lift one side up at a time. Under the lids she uses a quilt made of the foil covered thin insulation material that she also uses to wrap some of her hives. She has cut a small section in this quilt that lifts up to access her specially designed feeders. This allows her to fill them without disturbing the bees and keeps the two colonies from fighting. She has also fabricated a small black square she can attach candy to in order to feed the bees in the mini nucs.

This queen bee has an orange dot showing she is a good breeder. She was chosen for the traits Jennifer is striving for.

I asked Jennifer if she had any funny story to tell about her beekeeping knowing we all have some if we have kept bees as many years as she has. Sure enough, she told me a great story about a swarm catching experience in downtown Sausalito. While she was moving the swarm down into her box, climbing down a ladder, somehow the queen landed on her leg. Of course, all the bees wanted to surround the queen so she was quickly a one-legged swarm! She sat on the curb and shook the bees off herself. People were watching this marvelous entertainment and were astonished at her performance! It is too bad she could not have passed her bee hat around and collected tips like the street musicians do! Sausalito is a tourist attracting town just north of San Francisco. You won't find Jennifer Robin Berry listed as a regular street entertainer but wouldn't that be a fun act!

Her most challenging adventure in beekeeping was the night she managed to get her truck stuck out in a field. The field was, unfortunately, in a notoriously poor cell phone reception area. She had to hike out and about for over a mile until she could finally make a call to tell someone what had happened and why she would not be home that night. Since the truck was stuck out in a difficult-to-find area she said she would go back to it and spend the night! Morning could not come fast enough, for sure! The farm crew got her truck out when they arrived.



This is the sphere with the combs in place ready to add the bees and the top before it went on exhibit at the San Francisco Exploratorium.

Photo by Jennifer Robin Berry used with her permission to publish. This is Marie Claire listening to the bees at work in the sphere at the exhibit in the San Francisco Exploratorium.

Jennifer sees beekeeping as an extension of all her interests in life. She enjoys teaching others about good hive management, grafting larvae and rearing better queens in her workshops. She tells beekeepers if they don't know what to do when they open up a hive, close it and come back with a plan.

She believes there is no such thing as an emergency for bees. They handle problems as they come.

Jennifer currently is on the Marin County Beekeepers Club's board. She has agreed to take over the newsletter editor job for them. She wants to encourage members to contribute their knowledge by writing articles for the newsletter.

Another reason I consider Jennifer a Renaissance woman is that she has so many talents she uses to help others. Besides beekeeping she has participated in a program that sent her to Nepal to teach empowerment to a group of women. She is rightly proud of being able to guide the women to finding how they can empower themselves. They made a lot of changes in their lives because of this program and are continuing to make more. Jennifer keeps in contact with the group and is pleased with their progress. No, she did not teach them beekeeping but helped them see their self-worth in many other ways.

BC

Large Colonies Can Cause Large Problems

Can you believe I'm Complaining?

James E. **Tew**

I don't get to do this as often as I would like

My bees are presently too powerful and did not swarm enough. What? Yes, it is possible for bee things to be too good. Unfortunately, I don't get this good problem often enough. But you know me. Never a shortage of bee challenges.

Last month I described bad wintering luck that turned to good Spring season luck. Honey from winter-killed colonies resulted in a surfeit of stores for my new package bees. In a real way, my writing efforts here are a continuation of my thoughts last month. But first, a short story.

Many years ago, there was an insightful TV commercial in which members of a start-up company were shown popping champagne bottle corks as their first orders came in on their new web page. As the young entrepreneurs watched, more orders came in. More glad-handing and more champagne. Then more orders and even more orders. The celebrating began to wane as the orders grew exponentially. In the final scene, the group was standing there, mouths agape, as an insane number of orders poured in. Clearly, too much of a good thing. I have no idea what the commercial was selling, but the power of the web was made clear. I suppose it could be said that too much of a good thing can become a bad thing. In a way, this is a description of a dozen or so of my colonies. I started them from three-pound packages last April. Now, at around 70,000[1] bees per colony, enough is enough. These colonies are so good as to nearly be bad. Why?

***Varroa* Control**

As great a population as these colonies have, they will soon have a comparable *Varroa* population, too. Yet, to treat for mites will require dosing thousands and thousands of bees and related brood. The colonies are in four to five deep hive bodies. When opening the colony, bees boil out and are difficult to control. Simple colony manipulations result in clouds of bees in the air and all over me. Bluntly, this is work. This is not a hobby.

Figure 1 Landing board from a powerful Varroa-killed colony that was killed several seasons ago

But emphatically, I have been forced to learn that consistent *Varroa* control – in some form – is absolutely mandatory. These beautiful colonies can crash and crash spectacularly if I do not manage the *Varroa* population that parasitizes them. I have been down the "*these colonies are too good to fail*" road already and have the photos to prove my point. Without mite control, they will fail.

Queens and queen management

Why would you need to find the queen in powerhouse colonies? Reason #1: If I don't know where she is, how do I avoid crushing or otherwise killing her? Thousands of bees are amassed everywhere. Bees are accidentally crushed as I remove soundly stuck frames. Bees are crushed when I slide supers back into position. Broken burr combs are oozing honey. I would not necessarily even know that I had killed her. Reason #2: Even if the queen is providing a beautiful colony, as with Varroa management, experience has taught me that this queen will either be inclined to lead a swarm or will soon begin to fail. Beautiful colonies do not stay beautiful on their own.

Flying right in the face of, "*If it ain't broke, don't fix it*", timely beekeepers would be fully aware that the queen, in a perfect bee world, should be replaced just about every season. If my goal is to keep colonies this powerful indefinitely, I will need to consistently requeen – even if the colony is presently beautiful. I must confess that, due to a host of my personality traits, I would most likely not requeen colonies like these on a regular basis. I would probably just enjoy the moment. But that would mean that the colony must begin to decline before I implement queen replacement procedures. If my personal goal is to keep powerhouse colonies all the time, I should requeen all the time. Indirectly, this leave-alone mentality frequently leads to over populated colonies that issue late season swarms.

Late season swarms

Lest we forget, added to my constant harping on the subject, large managed colonies are not natural colonies. The bees always have their own biological needs – no matter what I want. I admit that I have a difficult time not feeling that a large, populous colony going into Winter is a great candidate for Winter survival. That is not always the case. Big colonies die during Winter, too, and not just from starvation. A healthy, good colony has a better wintering chance than a large, great colony with minimal mite treatment. Last month, for Winter survival, I boldly wrote that a healthy colony is more important that Winter stores. I have no science for that proclamation – only opinion.

As a colony approaches the Winter season, I sense that it wants a significantly reduced population size. Maybe a cause could be to economize Winter stores. Never mind that they have a ridiculous quantity of stores. In their natural world, food stocks would be precious; hence, the defensive sting[2]. So, some colonies may swarm. What could be their motive for this late season move? I don't know.

Without late season swarm control, my colony splits itself and

flies away with my productive queen leaving the parent colony to await the mating of a new queen with late season drones. Finding suitable drone populations may or may not be a problem. So how to control swarming (and *Varroa*)? Make late Summer/early Fall splits.

Late Summer/Autumn season splits

Though I didn't really want any more colonies, I felt that I had to split these hive behemoths. They had grown so heavy that the hive stand was sagging. *(While I seem to be complaining, I admit that I am mostly crying crocodile tears.)* As discussed above, I had very little chance of finding the queen. Fully suited and with smoker seriously lit, I ripped into the colonies.

At times like these, the typical, readily available, lightweight hive tool can be easily overpowered. I have small prybars that I use on occasions like this. I got the top full deeps off. That required me to make animalistic sounds and strain every part of my 72-year old body. In just a few minutes, I was to be reminded that getting them back into position was to be even more difficult. I normally work without gloves, but these colonies require full-suit protection. Even if I am not wearing gloves, a pair is always nearby. Gloves, though necessary, make this big job even more clumsy.

I made no effort to find the queen. If I had, I would most likely still be in the apiary. As quickly and as evenly as I could, I divided the colony in half. Realizing that the experienced foragers would return to the parent hive location, I made a feeble effort to give the relocated colony a bit more of everything.

Figure 2 The colony splitting operation underway

A long three to four days later, I returned to the colonies to search for eggs. I had purchased replacement queens, but that is another story for another time. Be prepared for this pronouncement though. For large splits like this, I would not buy queens again. They are too expensive, and I incur too much responsibility trying to introduce them. I will have much more to say about this at another time.

Figure 3 A powerful colony awaiting division

Here is an oddity

I was able to predict, from the outside bee activity, which halves were queenless. Yes, it was a good guess, but I had clear clues. The bees in the queenless halves, still powerful colonies, were restless and stingy. Many bees ran about the front of the hive and were clearly agitated. No, you can't make this one of the basic commandments of beekeeping, but it was not difficult to suspect which was without a queen leader.

Figure 4 The next day, the split colonies were still agitated and unsettled. The posted video clip catches the moment better. **https://youtu.be/559WL0_opDE**

And finally – neighbors

It would not be an article of mine if I did not mention my long-suffering neighbors. For those of you without neighbors, move on to the following sections. Those of you with close neighbors, listen up. One of the primary reasons that I became increasingly nervous about my mega hives, was due to the nearness of my bee-tolerant neighbor. Though I have put my bees as far from civilization as possible, there are still times when "civilians" get nearer than I like. When my neighbor mows his lawn, he is within fifteen feet of an estimated half million of my bees. I clearly feel responsible.

I want to keep my colonies healthy and in good shape, but I get no extra points for growing monster colonies. I have previously both written and spoken about this subject. Five full deeps of bees and honey is generally an overkill. *So, Jim, are you advocating small colonies?* No. Too small is as bad as too large. With small colonies, small hive beetles and wax moths become an issue.

Biggest is not always best

For a backyard hobby beekeeper (even most US beekeepers in general), I'm convinced that maxed out colonies are not the best, all around colonies. They are more difficult to manage and do not fulfill my "bee" needs. I can't say that I enjoy opening these monsters. In fact, I only open them when absolutely necessary. Protective clothing is required. The heat of the day is uncomfortable, and the weight of supers is highly significant. I crush too many bees, and colonies can remain agitated for several days. When you come across a nicely balanced colony, you will know it.

This one time, allow me to address the obvious

Time and again, in this article and others, I have referred to the weight of deep honey supers and their related labor – yet, I still use deeps. Why? Simple answer – because I have them. In his retirement years, my departed father had a small bee supply business. After he passed on, I became of the owner of a few hundred new, unassembled deeps and related frames and foundation. Presently, I am only about half way through them. At my current use rate, I have enough to go ten to fifteen more ⇨

CALENDAR

♦KANSAS♦

Kansas Honey Producers Association 2020 Fall Virtual meeting is tentatively scheduled for October 23-24.

Stay tuned for updates on speakers and presentations at the KHPA website www.kansashoneyproducers.org or contact Joli Winer, **joli@heartlandhoney.com,** 913.593.3562.

♦MICHIGAN♦

The following Michiana Beekeepers monthly meetings for 2020 will be held at the Nappenee Public Library, on date shown from 9 a.m. to 12 noon.

September 19th - Speaker Dr. Jeff Pettis

October 17th - Speaker Dr. Jim Tew

For more information and to register contact Debbie, 574.277.0152.

♦NEW HAMPSHIRE♦

New Hampshire Beekeepers Association will hold their Fall meeting October 17 at Manchester Community College, 1066 Front Street**.**

If held in person it will be 9:00 a.m. to 3:00 p.m. Lunch will be provided for a fee. If the meeting cannot be held in person it will be held online.

Keynote speaker is Samuel Ramsey.

Check the NHBA website **www.nhbeekeepers.org** for any change in location.

♦OREGON♦

Oregon State Beekeepers Association 2020 Fall Conference online Tentative Dates and Times: October 24-25 9:45a.m. to 6:00 p.m. with breaks; Wednesdays, October 28-November 18, 7-9:30p.m.; Saturday, November 21, 10:00 a.m. - noon.

Speakers include Shelley Hoover, Andony Melathopoulos, Ramesh Sagili, Priya Chakrabarti Basu, Ian Steppler, Elina Nino, Ellie Chapkin, Emily Carlson, Nick naeger, George Hansen and more.

Information and updates **orsba.org.**

♦VIRGINIA♦

October 10-11

Sun Hive Workshop: Learn how to build the Sun Hive! This exciting hands-on hive building experience will be accompanied by lectures related to the importance of hive scent and warmth, wax, form and hive body materials. Classes take place at Spikenard Honey bee Sanctuary in Floyd, VA. website: **www.spikenardfarm.org** contact: **info@spikenardfarm.org** or 540-745-2153

years. My reasons are not sentimental so much as financially practical. Ironically, using deeps is about the only thing standardized in my apiary. I try everything new and improvise on my own. Consequently, I do not have a particularly attractive apiary. I envy those of you who do.

Upon hearing my litany of weight woes, friendly beekeepers will suggest that I move to 8-frame equipment. I am not opposed to that move, but I have all of this equipment. Plus – get ready for it – I don't find that the absence of two frames makes my 72-year-old back that much happier. The weight is still more than I should bear. So, I do what so many others before me have done – remove individual frames. Oh, the bees love that, but it works.

I tinker with different styles of equipment. In years past, I used some top bar hives and other non-standard equipment. I use different paint finishes – if I paint at all. I mix expanded polystyrene equipment with traditional wooden equipment. Essentially, I tinker. I form opinions, and then I change them. This brings me to my last point.

The bees don't change, but beekeepers do.

During my years as a beekeeper, I have been many beekeepers. It was only when I passed through my sixties and crossed into seventy that super weight began to weigh on me. There was a time when I wanted all things beekeeping. Now, I don't know where I would put it. Decades ago, I was a small-time queen producer. Too much work. I'll just buy them. Now the price so high and the availability so slim that I am back to considering raising some cells for my personal use. Yet, throughout all my evolution, bees are still being bees. I can't tell that they have changed much. I'm the one who keeps changing. As a young man, I would have loved nothing but large colonies. Now I want enjoyable colonies. Yet another change.

Thanks, as always for reading. I always realize that you could have been doing something else. Maybe the attached video will help me make my points. I hope to you are around next month. BC

Dr. James E. Tew
Emeritus Faculty, Entomology
The Ohio State University and
One Tew Bee, LLC

[1] Burgett, Michael, and Intawat Burikam. 1985. Number of Adult Honey Bees (Hymenoptera: Apidae) Occupying a Comb: A Standard for Estimating Colony Populations. J. Econ. Emtomol. 78: 1154-1156. **https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjO6uOjmpbrAhVaWs0KHaAqBK0QFjAAegQIAxAB&url=https%3A%2F%2Fir.library.oregonstate.edu%2Fdownloads%2Fsb397901c&usg=AOvVaw3bQvlZYo6aG_lTOeXcRIxZ**

[2] Please know that I do not have scientific proof of this belief. I offer this opinion as personal experience, but not proven fact.

Display Advertisers

In July my gal Marilyn and I traveled to Durango, where I gave my "Keep it simple!" beeyard demonstration for the second year running.

Before we headed home, I visited with my college roommate Roger, whom I had not laid eyes on in more than a half-century. At Colorado State, Roger and I shared a room in a private home. Thirty bucks a month covered the rent, plus supper.

At the end of a long driveway somewhere back of beyond, I spotted a wizened old man in overalls leaning on a shovel. He was waiting for me, God bless him. "Roger! You don't have the Covid, do you?" I cried as I threw my arm around him. I just couldn't help myself.

"I'd call this the middle of nowhere," I continued.

"I call it the center of the universe," he replied.

In college, Roger and I espoused a particular variety of political extremism. For all these decades, he stuck with his beliefs, while in the fullness of time I lost my moorings and drifted to the other side.

Roger remembered I can talk Mexican, so our conversation occasionally went bi-lingual. He'd been on the verge of losing the Spanish spoken for generations in his family -- until he married a Colombian.

Roger hops around like a billy goat. I have a hitch in my git-along, so when he led me down to his bridge on the Piedra River, I kept up the best I could. His eight-week border collie tagged along. Roger showed me the electrified fence that the bear just demolished, along with his bees.

We talked about bees and sheep and chickens, about that border collie pup, and about his passion -- stewardship of this land homesteaded by his forefathers. When we got to politics, I found his arguments still lucid and rational, assuming you accepted certain hypotheses. Nothing had changed since our college days, except me.

When I got up to leave, he said, "Come back, I want to meet Marilyn."

"Sure," I said, "I'll bring my fly rod."

We stayed with Neil and Tina on the road to Pagosa Springs. Tina gave me queen grafting lessons, and when Marilyn admired one of her roosters, Tina said, "Take him home with you!"

We stopped In Montrose on the way back. When Marilyn opened the Subaru back door to give the rooster a drink, her new pet exploded out of his cardboard box, landing in the front seat on my arm, which rested reassuringly on our blue heeler Pepper. Once everyone calmed down, I said, "If your rooster had gone the other way, we'd have had to leave him to the good citizens of Montrose to deal with."

The other day a woman called, offering to give me two beehives because, she said, "I've been stung three times in three months. I swell up, and I've had it!" She and I understood she could have sold those bees, but sometimes a girl just needs to get on with her life.

By the time I got there, it was only one hive she wanted to get rid of – the mean one. Its two medium brood boxes were crammed full of honey, brood and bees. This was the one I wanted. She could keep her dink hive.

As I loaded the little darlings onto my pickup, I waxed rhapsodic about the benefits of belonging to the Colorado State Beekeeping Association, which as a hobbyist she could join for a mere 10 bucks. When I told her about Varroa mites, she didn't say much. Gentle reader, I can sense when I'm not getting through.

She took me up to her vegetable garden with its chest-high tomato plants and monster cabbages. I told her she had the green thumb.

It was nearly dark when we walked back to my truck. We were saying our goodbyes and thanking each other when suddenly a bee peppered her veil. She screamed and flailed her arms, as she beat a quick retreat.

"Maybe you should stick to gardening!" I called out.

"Maybe I should," she yelled back.

It's Aug. 13 as I write. The other day we drove up to the Grand Mesa. On the last switchback we pulled off to watch smoke belching out of the then-30,000 acre Pine Creek Fire in the Book Cliffs, across the Colorado River valley. While Marilyn and Pepper walked around a little lake at 9,800 feet, I stayed back to admire honey bees working the fireweed. I wondered if they were feral survivors, or if someone had a hive nearby.

I thought we were safely out of cell phone range until Megan called, in full-blown bee panic. She lives in a trendy little town full of "organic" beekeepers. Her mite numbers had exploded, and she'd even found some deformed wing virus in one of her colonies. This virus is one of several associated with too-high mite numbers. She worried that her Hopguard 3 treatment was too little, too late, even though she was seeing significant mite drop on her bottom boards. I laid out some options, but I try not to tell anybody what to do. Beekeepers need to make their own decisions and their own mistakes. Otherwise how are they going to learn?

I took heart when she told me she worries about her bees in the wee hours. Beekeeping requires a commitment beyond hoping for the best. Megan gets that. She's going to make the cut. Maybe she already has.

Ed **Colby**

Long Lost Friend

BOTTOM BOARD