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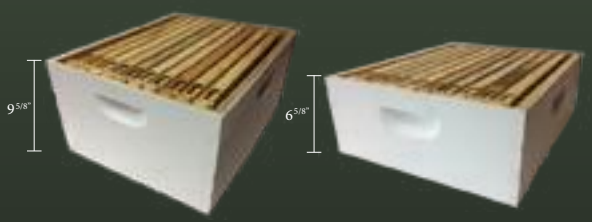

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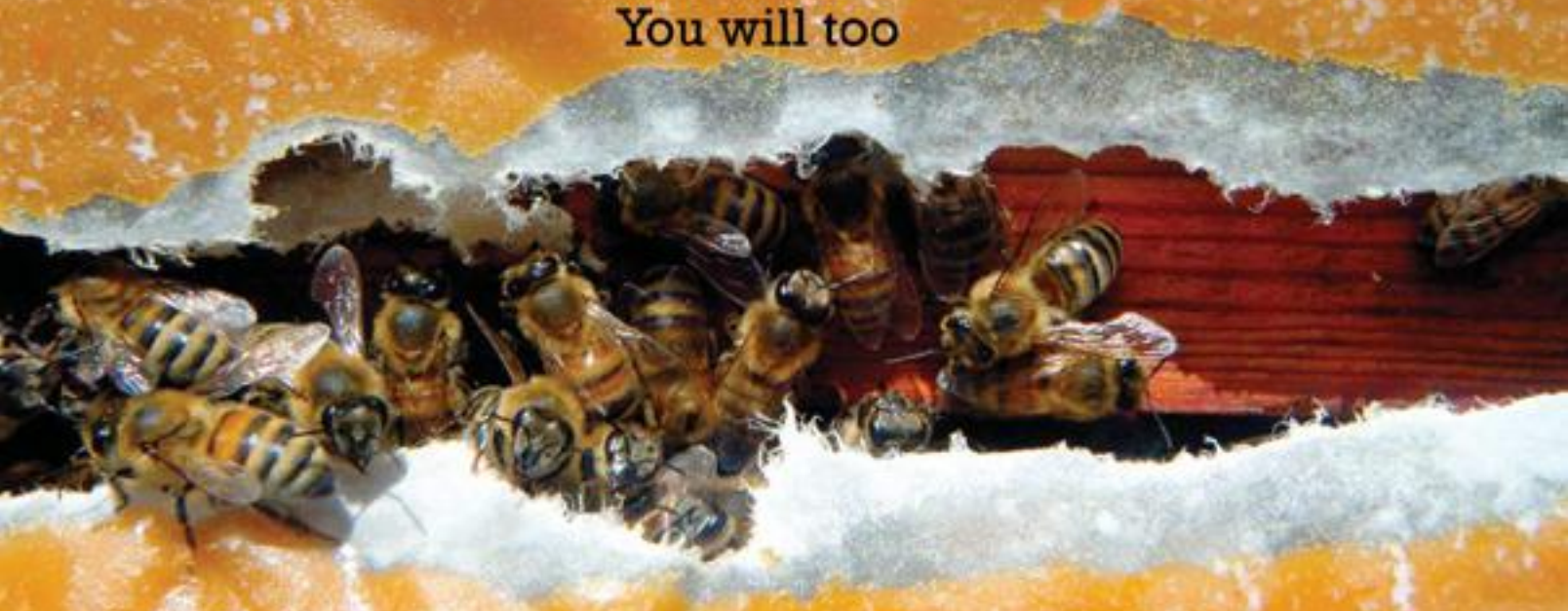

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Bee Culture

August Features . . .

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Kim & Jim Show

I really like watching other people work their bees so the Kim and Jim show was wonderful. I'll be back for more.

I realize you are not on a sound stage but at times the audio was a bit low.

Bruce Bryant

Editor's Note: Thanks for the kind words on the webinar – we are still chasing the best way to do audio outside with the equipment we have, and it's getting better, but not yet perfect. Thanks for the input, and, as is often heard – technology is great when it works – stay tuned, we'll get better. And thanks again.

June Bee Culture

As always, *BC* is terrific reading, but I particularly enjoyed June's articles on smokers, external hive inspections, and Peter Sieling's "A Honey Bees Guide to Managing Beekeepers." I'd like to toss out a comment regarding each one, to your readers, if I may.

Regarding the cleaning of smokers, I have found that immersing them in a 50/50 water and white distilled vinegar (super cheap in gallon jugs at Costco) solution and letting the parts soak overnight does a great job at removing the accumulated creosote. I remove the bellows, as I don't know if the material will handle the acidic vinegar, plus it's much less bulky that way. Wiping with a course cloth, and maybe some light scrubbing around the edges, and you have a shiny, practically new, smoker. No scraping or scouring, and you can save the vinegar solution for next time. Remember to flush the solution down the toilet when done.

Regarding Ross's external hive inspections and Peter's really clever, funny, and educational "Guide", I just want to say that both reinforce the often stated advice that it's best to avoid going deep into the hive (beyond where you see a bit of brood) unless it's absolutely necessary.

A quick inspection peek inside the top super(s) may be ok, on occasion and if deemed necessary, but it's best to not go deeper into the hive unless extraordinary circumstances dictate otherwise. Knowing what these extraordinary circumstances are is one of the keys elements of responsible bee stewardship.

Dan Smith
Santa Barbara, CA

How Crazy Are Beekeepers?

This past Sunday afternoon, DC, Cindy and I loaded up my truck and headed for a ranch about five miles West of I-95 on Hwy 192 in central Florida. A friend had contacted Cindy explaining there was a colony of bees in a woodpile on the ranch. She was concerned since the colony was just a few yards away from where her children would be standing to catch the bus come the start of school. In typical intrepid fashion, Cindy had applauded her for making the decision to "save the bees," assuring her "we could help!"

Upon arrival, we took a quick look at where the colony was located and started putting on our safety gear. Almost immediately we noticed this appeared to be an active colony. Upon minor disruption it became apparent this was also an "angry" or "hot" colony. While none of us are entomologists, it soon became clear

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that his colony displayed many, of the signs of being Africanized. Angry bees swarmed around all three of us not in the 10s but in the 100s, they were relentless and when we moved away, even at a distance, the attack did not relent. Fortunately, the safety gear did its job and we received only an occasional sting (that evening I quit counting stingers in my gloves, hood, and jacket somewhere North of 150. Fortunately most of these did not get thru the material). Half way through the removal, a strong thunderstorm moved over and dumped a copious amount of rain on the whole operation. We were not just wet, we were soaked to the bone. Our veils looked like your pool enclosure when water gets on the screen. Furthermore, the rain drops were freezing cold! The rain made the removal of the comb especially messy and we were now covered in honey (gloves, clothes, shoes). As the population dwindled due to DC and Cindy's relentless effort with the vacuum, the occasional stings continued. (All of us received at least 20 stings). In about an hour the bees were mostly in the vacuum, and we retreated to loading the truck and making our exit.

As we were driving away, soaking wet, freezing cold, covered in honey and still nursing our stings, we were quiet, each assessing what had just happened. After a few miles, DC speaks up and says "THAT WAS A BLAST"! We all agreed! "Beekeepers are some strange people"!

Stuart Rowan
Melbourne, FL

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Number 1 Tip of the Month – Robbing Screen

I like to split my colonies after the honey flow while there are still plenty of mature drones flying. I feel that this gives me healthy well mated queens. I also get a brood break to make my oxalic acid treatment effective.

The main problem with this is the risk of my small nucs getting robbed out by stronger colonies.

My solution is a robbing screen made from a scrap of window screen and a Spring clamp. Bees that call this nuc home have no problem figuring out how to enter. This is also much easier to defend from robbers that focus on the scent of the opening. This should be put on when the nuc is made up, do not wait for robbing to start. I also believe doing this makes the bees easier to live with for you and your neighbors.

Heath Wind, Winston Salem, NC

Bee Culture wants you to share your good ideas with our readers. Be precise and include a photo or sketch if possible, but that may not be necessary. If we use your idea you get a free one-year subscription. The best each month gets $100.

I like to know what woodenware equipment I'm using for each hive, especially when using the Snelgrove double screen board method for swarm control. I've found a good way to do this is to color-code the individual hive components with different color paints.

Bottom boards are natural, slatted racks are blue, hive bodies containing the queen have a geometric design, queen excluders are orange, honey supers are any solid color, and Snelgrove boards are green. Brenda Nye, Burlington, CT

Saving my fingers and back – I find that it is getting more difficult to pick up heavy deeps and honey supers with basically my finger tips so I bought some kayak carry handles and attached them to four of my deeps as a trial. So far it has made a huge difference when moving the deeps so I am slowly attaching them to the rest of my deeps and supers. I decided on these types of handles because I figured if they can hold up to the wear and tear of the water then they should be able to stand up to the weather in northeast Ohio. I found them on a well known online shopping site in their warehouse section for between $5.00 and $8.00 a pair. I attached them with nuts, washers and 1 1/4 inch bolts instead of the screws they came with. Kevin Perrin, Medina Ohio.

Honey Warmer

How do you de-crystallize honey? I have tried a few different ways. First, I scooped it out of the five-gallon bucket where it had crystallized into quart jars that were then warmed in a pot of water on the stove. You have to closely watch the heat since you don't want to let it get too hot and kill all the good stuff in the honey. Lately, I have been using a crock pot which holds four quart Ball jars. When on the low setting, this will de-crystallize the honey in a day or two. This has the advantage of "set and forget" but I needed a method with a little more capacity where I could warm more than four quart jars at a time or honey that was in five gallon buckets.

There are many ideas for honey warming cabinets on the internet. Most involve an insulated box with a heat source. My intent was to incorporate all the best ideas. My design uses a medium hive body with an incandescent light bulb mounted inside, on a plywood base with a removable foam telescoping box top.

Safety was a concern, so I purchased a porcelain base for the light bulb and a four inch metal octagon electrical box where I made all my electrical connections. I also purchased a 110V temperature controller thermostat with a digital LED display and remote temperature sensor on EBay for $4.25. The controller was mounted on the outside of the medium hive body with the wires passing through a hole I drilled into the metal octagon box. The wires on the controller were pretty light gauge stranded wire, so I tinned the ends with solder to prevent fraying. Make sure you know how to wire or bench test the controller first, as the one I bought had black wires that were actually the common (-) which are normally white with red for input (+) and yellow for output or load (+).

Once the controller and light bulb were installed and wired, I mounted the medium on a piece of plywood. To hold the honey, I cut 1 x 3 firing strips to length so that they would set on the frame rests in the medium.

The last step was to build the cover. I made mine from two layers of 1" foam board sized to fit snugly over the medium. All corners were glued and taped for durability.

Testing has been successful. It takes about five days to liquefy eight quarts with the thermostat set to between 38 and 40 degrees Celsius (100-102° F) I have not tested with a five-gallon bucket yet, but plan to after this year's harvest. I might also try stacking honey supers in place of the cover if I ever need to warm some prior to extracting. Jeff Rysenga, Fremont, IN

Keep It Simple

For years, beside other treatments, for over wintering I do two main things:

A – By end of September, I feed the bees with 2:1sugar syrup as much as they can eat…

B – I take a special care for keeping the hives warm and ventilated with two one inch plastic pipes through the hole of the inner cover, separated with metal screen 1/8". Over the inner cover and underneath, I put sheep's wool – plus two jars as water deposits. Esat Nuro, Fairview Park, OH

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New For The Beekeeper –

In 2007 Arizona Apiaries our sister company was founded. It started out with only 500 hives and quickly grew to over 6000. In the process of growing the operation the CEO Vicente Gonzalez had trouble keeping track of the amount of hives he had, the location of the hives, as well as the tasks being completed each day and the amount of labor hours involved to complete those tasks. In an effort to solve his problems he met with a software engineer Vladimir Marquez and his experienced team. Together they co-founded Bee Technologies LLC and designed a platform they call TheBapp.

TheBapp is a two part platform; The control panel used in the office, and the application that is used by beekeepers in the field. Through the app your beekeepers can know exactly where the apiaries are located through built in GPS navigation, the exact number of hives installed in each apiary and even the work history of each location. They can leave notes, pictures, and voice memos per each location as well as document dead-outs, splits, honey production, feeding, treatments and tests as well as keep record when transferring bee hives from one location to another. The app has a built in time clock, so that you will always know the exact hours worked when doing payroll and budgeting.

Control panel; The Website is where you can check everything that happens in your company, view reports on what was done in the day, see how much you have fed each apiary, and the amount of honey produced at each location. You can see the exact amount of hives you have total and in each beeyard. There is also activity updates, and information on demand all organized and easy to understand on the control panel. This facilitates the office workload and helps you plan ahead and know what's happening in your company at all times.

TheBapp was initially built only to keep track of the most basic functions, such as keeping track of the dead outs, splits and total amount of colonies in the operation. In 2017 after Arizona Apiaries began to see all of the benefits of technology they decided to present the idea to other commercial beekeepers at the California Beekeepers convention in Lake Tahoe. Fellow Beekeepers immediately saw the potential in the program and began offering their ideas to make TheBapp universal for all commercial beekeepers. After further development of the program in May of 2018 Bee technologies began offering the program to other companies and since has put over 300,000 colonies into the system.

With the dual effort between a commercial beekeeper and a strong team of engineers we will continue to implement the new ideas we get from our valued customers, as well as maintain and improve the current features we offer. At this time we only provide services for commercial beekeepers. We are currently building a system for hobbyist and sideliner beekeepers so they can have a competitive edge as well. We will be unrolling these versions in the near future.

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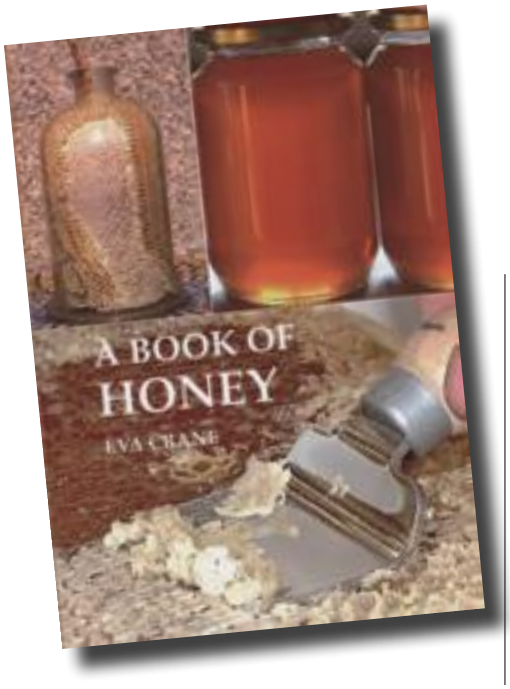
A Book Of Honey, by Eva Crane. First published in 1975, republished 2019 by IBRA and Northern Bee Books. ISBN 978-0-86098-288-3. 193 pages, black and white, soft cover. $38.00 plus post from Northern Bee Books and other sources.

There are only a few books that every beekeeper should have at home, and this is one of them. Out of print for years, it is finally available again and get one yesterday if you can. Eva Crane was, and in many ways still is the best source of bee and beekeeping information there is. This is not only a classic, it is a necessary piece of beekeeping history, lore and knowledge.

From the back cover: Upon her death in 2007, the New York Times acknowledged that Eva Crane wrote some of the most important books on bees and apiculture. A Book of Honey is one of her seminal works and must be on the shelves of anyone who is serious about understanding honey. Not only does it describe how and why bees make honey, but she also describes in detail the constituents and characteristics of honey. There is a chapter on the uses of honey in the kitchen as well as mead-making, medical remedies and cosmetics.

Eva describes the history of honey starting from the evolution of plants and bees, then on to the harvesting of honey by humans over the past 10,000 years and its religious significance and beliefs.

There is a huge databank of information to facilitate further detailed study, making this an essential read for both teachers and students. Please note that Eva' s comments at the end of her preface refer to the original cover which as now been replaced in this 2019 reprint. – *Kim Flottum*



foulbrood that recently went into effect, beekeepers now have to think about the local vet. And local vets are fewer and farther between than ever, in case you haven't noticed.

A few highlights from the article, by Betsy Freese, Exec. Editor of Successful Farming. She interviewed 21 vets in 13 states.

- There are about 500 counties in the U.S. underserved by a vet in 2019, mostly rural and there are shortages in 44 states.
- Large animal vets have a lot of job offers, but the pay isn't close to that of vets in metropolitan areas, and rural vets are on call something like 180 days a year, 24-7.
- The largest employer of vets in the world is a candy company. Mars Candies owns more than 2,000 vet hospitals in the U.S. and Europe with over 50,000 employees.
- Of the over 30,000 vet practices in the U.S., about 3,500 are corporate-owned.
- More than 60% of the 110,000 vets in the U.S. are women
- Vet schools now are 80-90% women students
- 2018 graduates from U.S. Vet colleges averaged $143,000 in debt
- Scholarships, grants and loans are increasing to help with debt, but there are strings attached on getting a job after school
- Only 10% of final year students have an interest in food animal medicine at graduation
- Rural mixed animal vets are the most in demand, and are being replaced by nonveterinarians working for non-profits with products to sell direct to farmers
- Basically, vets are undervalued
- Who is going to sign up for a career of cutting a cow open a 2 a.m. with compensation lower than what a plumber makes?

Choices. Often they aren't easy. Or even possible.

Honey Bee Colony Losses 2018-2019 – Preliminary Results

The Bee Informed Partnership (BIP; **http://beeinformed.org**) recently conducted the 13th annual survey of managed honey bee colony losses in the United States. This past year, 4,696 beekeepers collectively managing 319,787 colonies as of October 2018 provided validated colony loss survey responses. The number of colonies managed by surveyed respondents represents 11.9% of the estimated 2.69 million managed honey-producing colonies in the nation (USDA, 2018).

During the 2018-2019 Winter (1 October 2018 – 1 April 2019), an estimated 37.7% of managed honey bee colonies in the United States were lost (Fig. 1). This loss represents an increase of 7 percentage points compared to last year (30.7%), and an increase of 8.9 percentage points compared to the 13-year average Winter colony loss rate of 28.8%. This year's estimate is the highest level of Winter losses reported since the survey began in 2006-2007.

Similar to previous years, backyard beekeepers lost more colonies over the Winter (39.8%) compared to sideline (36.5%) and commercial (37.5%) beekeepers. Backyard, sideline, and commercial beekeepers are defined as those managing 50 or fewer colonies, 51 to 500 colonies, and 501 or more colonies, respectively.

Our survey also asked what level of Winter loss would be acceptable by beekeepers. Interestingly, this revealed an increase from 20.6% last year to 22.2% this year, which is much greater than the 11-year average of 17%. This increased acceptable loss may indicate that beekeepers are more realistic or pragmatic in their expectations of colony losses. Even with a higher acceptable loss, sixty-two percent of responding beekeepers lost more colonies than the level deemed acceptable.

During the Summer 2018 season (1 April 2018 – 1 October 2018), an estimated 20.5% of managed colonies were lost in the U.S. This level is slightly higher (3.4 percentage points) than the previous Summer's colony loss estimate of 17.1%, but is on par with the Summer loss average reported by beekeepers since 2010-2011 (20.5%), when Summer losses were first recorded by the BIP.

For the entire survey period (1 April 2018 – 1 April 2019), beekeepers in the U.S. lost an estimated 40.7% of their managed honey bee colonies. This is similar to last year's annual loss estimate of 40.1%, but slightly higher (2.9 percentage points) than the average annual rate of loss reported by beekeepers since 2010-11 (37.8%).

We note that loss rate for each period was estimated by identifying the total number of at-risk-colonies that died, and that annual loss rate was not estimated by summing the individual Summer and Winter loss rates. This year's state-specific loss rates will be added to previous years' results on the BIP website shortly (**https://bip2.beeinformed.org/loss-map/**). BC

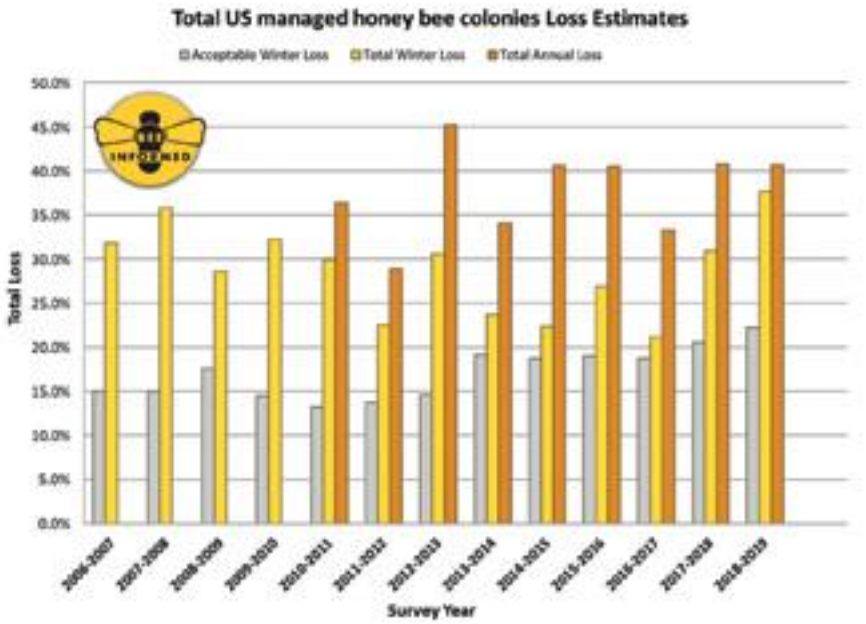


***Fig 1**. Total Winter colony loss rate in the United States across years of the Bee Informed Partnership's National Honey Bee Colony Loss Survey (yellow bars; 1 October – 1 April). Total annual loss estimates (orange bars) include total Winter and Summer (1 April – 1 October) losses; the latter has been estimated since 2010-2011 only. The acceptable Winter loss rate (grey bars) is the average percentage of acceptable Winter colony loss declared by the survey participants in each year of the survey.*

INNER COVER

The weather won this Spring. For the first time in – I guess nearly 50 years – I didn't have some kind of garden out back. There's been years when that out-back garden was only a couple of tomatoes stuck in the ground or in a pot next to the back step just out of reach of the dog chain. That's the least out-back garden I've had, and, there have been a lot years when it wasn't much more. That inch by inch itch just doesn't go away. But for the last 30 some years though there's been a 40' x 40' plot in back that has been slowly improving in terms of organic matter, drainage, fertility and production.

It's lake bottom clay, but for the regular stuff – tomatoes, peppers, vine crops of all kinds along with cabbage, broccoli, and the leafy stuff it's pretty good. Kale did fantastic the one year we tried it and the chickens feasted all Summer on that stuff. Lettuces of every kind and color always do well, and all kinds of peas and beans that have a special place on the far side with a permanent climbing fence all their own. And of course every year we try something new or different that works, or doesn't, but is always fun no matter what. And when it doesn't work the chickens get the leftovers.

We do the compost thing, kind of, right next to the asparagus which is right next to the garden and the blackberries. It's three side-by-side sections are made from pallets. Each section is a pallet's tall-side wide and two deep, with a middle section made from shared walls to keep posts and pallets to a minimum. All told, it cost me about $20 for posts and ties to hold the pallets to the posts. Pallets, if you look, are usually free for the taking if you're not fussy about a missing board or two, so you take 15 when you need 10 and fix those with missing parts. A bit of labor, but I keep bees – who's counting.

So there's compost in all three sections most of the Summer. One gets filled, then the next, then the last, and then, if time and energy permit the first one gets turned before more is added. That happens sometimes. And sometimes not (see labor, above). Most of what gets added is the chicken coop floor clean-up from overwinter and Summer coop stuff as time and mess dictate. Mostly straw, chicken manure and spilled chicken feed, it takes care of itself with the usual amount of rain and the other stuff that gets added on top during the Summer. A section full of whatever, top to bottom front to back, gets reduced to about a foot-high pile of really good compost to add to the garden by next spring.

Any weeds that get pulled in the garden, yard edge or flower beds get a one way trip to the chickens who relish the green stuff. Pretty much all summer the lawn doesn't get mowed nearly as often as the neighbors, so chickens get the piles of cut grass that's raked up so what's left doesn't get covered. They get all the out of place purple loosestrife, wild grapes, or any of a thousand kinds of weeds that seem to flourish in our back acre when and if they get pulled. There's a saying – I think I made it up, but probably not – chickens will eat almost anything, and almost everything eats chicken (hawks, coyotes, fox, skunks, neighbor dogs, owls, racoons, take your pick).

Anyway, back in early June I took a long weekend to do the garden thing. The rototiller was overhauled and ready, the seedlings I'd started way back in December and January were ready and so were the transplants I'd bought and nursed this long, all eager to get roots in the ground and get going. It rained two out of every three days in late May and June so I wasn't surprised when the forecast predicted nine out of 11 days more rain the day I wanted to begin. And it rained, and rained.

I knew in would be at least, at least, two weeks before I could get the rototiller into the garden after it finally quit and by then it would be pushing the first day of Summer. And another piece of this is that I'm gone, a lot, so whatever rain-free windows there were got lost. The weather won round one.

Choices. Like anything else in life, you have choices. With bees, you can combine weak colonies so one strong colony thrives, or you can requeen the weak one and hope. You can feed early so they take advantage of that early flow, or you can measure and treat and measure again and treat again to keep *Varroa* near zero and make splits all Summer ignoring the honey and sell bees all Summer. Obviously you can ignore mites completely and hope. Or you can overwinter those nucs and make Spring splits for more bees and even more money. Of course you can use Russians if you start late or Carniolans if you start early, and you can move those bees to honey or pollination sites for money or you can stay home all year if it's safe. And now you can use at least a dozen differ-

Choices.

ent kinds of hives for your bees that fit you, no matter what the bees think. Those hives can be wood or plastic or poly or thick or thin wall or top bar or warre or long or eight frame or 10 frame or deeps or mediums or mixed. You can harvest honey early and often for all manner of different varietals, or you can let it sit for a while and then harvest Summer honey later and then harvest Fall honey even later or just let it sit all Summer and make – ugh – wildflower honey. And anytime you can blend for color or flavor or make mead. Of course that honey can be liquid, comb, cut comb, chunk or creamed and you can sell it in any size or kind of container you want from home or at work or at the local farm market or grocery store or you can put it in a pail or barrel and sell it to the highest bidder. Choices, there's always lots of choices.

So, I had a three day weekend to make that garden choice. Wait, or . . .?

Well, if not in the regular garden, where? Not many choices but pots on the deck won. I have a pretty big deck, lots of pots, and potting mix and fertilizer is cheap in the spring. I've raised all manner of garden stuff on the deck over the years by choice so this wasn't new. Just more. Forty some pepper plants, 30 some tomatoes, and a few, actually far fewer other choices – vines, beans, peas.

It's July holiday weekend now, and all of the above are doing well. I've learned – though you don't get quite as much no matter how green your thumb is, but there's always munchables when you walk out there, and more than enough for supper and to give away (I love growing hot, hot peppers because they are a truly a pretty plant, but I'll never eat one – food shouldn't hurt you know), and I can put together a basket of a dozen different tomatoes for folks at work and neighbors who don't get the garden itch anymore, but still love the home-grown flavors of our produce.

But the one choice I couldn't make this year became completely obvious almost instantly. A raised bed garden. Duh. It had never been something to consider but suddenly it was the only thing to consider. I have lawn adjacent to the deck that's only a step away (read no muddy paths), easy to work (you can reach everything without much of a stretch), easy to manage (no hose to drag and sprinklers to water), easy to expand and just plain easy, no matter the weather, ever. And, when all is said and done, retiring the rototiller, the shovel, the sprinkler system, the drainage system, the mulching and weeding and all the rest won't be too much to let go (sorry chickens). The compost is close and easy to keep using. And you can grow anything you want in the right raised bed garden with the right soil and exposure. And I have soil and exposure and fertilizer down to a science. Too often the best choice doesn't come along until all the rest don't work.

The weather won round one this year. But I got the last word though because I'm still getting some tomatoes and peppers. There are always choices. But you know, don't overlook the one that's the best one, even if it's the last one.

•

That weather won a lot of other matches this Spring too. Planting corn and soybeans didn't happen in a lot of places for the same reason my garden didn't get in. But even so, farmers had some choices. One of those was, instead of the regular crop that couldn't get in, later planting of cover crops was an option. What an opportunity that could have been, right? Can you imagine instead of something like 90+ million acres of corn and nearly that much soy, there could have been some millions of acres of cover crops like turnips, radishes, crimson or berseem clover, field peas or a vetch crop? Even mustard crops, buckwheat or brassicas? Let go to bloom but not mature to seed, these crops would have done farmers a world of good for soil help, weed control, helped with some of the USDA regs on crop insurance and trade assistance acres for prevent plant options, and think of your bees next to a county's worth of clover or vetch!

Some farmers made that work, but most were caught by surprise as were the seed companies and not nearly enough of what we would have liked got planted. Rather, grasses, forages, crops for silage, haylage and baleage made the cut because there was some of that seed and a farmer could plant them, and harvest for winter food after September 1, rather than after November 1 as usual when considering a cover crop for animal feed.

Choices. The best one was the first one, but it didn't, mostly, get a chance.

•

More Choices. This is a blatant commercial for two things. First, the KIM&JIM Show, with Jim Tew, me, and usually other fine folks. The next to last one we did as I write this Jim was in France talking to the Veto Pharma folks about what they do relative to medications and testing equipment for varroa and looking at their extracting facility. The next show was where we worked bees at the A.I. Root Homestead, looking at the packages we put in this Spring and then sitting on A.I.'s front porch talking about all the fine folks over the past 150 or so years that have sat in the same place talking about – what else, bees, beekeeping and beekeepers. It was sort of one of those moments you don't get to do very often. Next, if it worked, by now, we'll have traveled to Jim's beeyard, looking at his repaired fence, the new development going up right next door and what that's going to mean for his bees, liability and more – and we don't exactly know what more that is going to be. Check it out.

BEEKEEPINGTODAYPODCAST.COM has some new interviews going for it too. Movie people, all the Pollinator Week folks we talked to, and Brad Root talking about the second 50 year history of the Root Company. And, more I'm sure since there's a three plus week delay between this and when you get it in the mail – so, Surprise! Take a look at our podcast series. Never a dull moment.

Choices. There's always lots of choices.

•

Always lots of choices, except sometimes.

One of the farm magazines we get here had an article on Veterinarians recently. With the change in obtaining antibiotics for controlling

Continued on Page 16

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It's Summers Time –

Family, Poultry and Fun

In late June Kim and I had a rare oppotunity for travel that didn't involve a bee meeting or some other beekeeping adventure. We went to Colorado Springs for a Flottum nephew's wedding.

What a gorgeous place. I was there when I was about 12 for a family vacation. Other than that, it's been just passing through the Denver airport on occasion. So this was a real treat. Each day we woke up and looked out at the beautiful mountains. It was hot the week we were there – in the 90s. But it's that dry heat, don't you know!

The wedding was held at a place called Garden of the Gods. If you're familiar with it, then you know what I'm talking about – absolutely amazing. It doesn't look real. We had a wonderful visit with Kim's family which we don't get to do very often.

Then it was home to deal with deadlines and plants and birds and mowing and heat and rain. We took a few more days off around the 4th of July to work in the yard. We got some of our young, strong help out there for a day and in spite of the heat and our age, Kim and I got a lot done.

The poultry situation has been although, still a lot of fun, a bit bumpy this past month and mysterious at times. We have, on any given day 14 or 15 adult hens. There is one chicken that we're not entirely sure who she belongs to. We had one like her that disappeared for awhile – maybe she went to the neighbor's house. Then shortly before we left for CO we started having odd happenings at night. I was never really sure how many chickens I should have. I told the good friend that takes care of them while we're gone that she might have 14 or 15 and not to worry.

The foster chicks that we raised went to their new home right before our travels. There were 10 Rhode Island Reds – one young rooster and nine hens. After two weeks at the new place something got into the coop and took/destroyed all 10 of them. It was heartbreaking to all of us. We have coyotes and we have a lot of raccoons in this area, so it could have been either. Very sad!

As for our young flock, we have seven Call ducks and seven young hens. We lost one little duck early on and I think we started with nine chicks. It got hard to keep track of all of these young chicks.

Garden of the Gods, Colorado Springs.

We have one little crippled chick. And I just never know what to do in this situation. She's eating and growing and as far as I can tell doesn't seem to be in distress. The other birds are not picking on her. I know if we were true farmers we would already have disposed of her, but I can't do that. So we'll see what happens. I'll keep you posted.

Then we have three 'Houdini' chicks. Almost everyday they get out of the pen. One Americauna is the ring leader. Once out of the pen she freaks out and runs back and forth trying to figure out how to get back in. Not the smartest birds in the world! So we open the gate, guide her back in to where all of her friends are and depending on the time of day we'll have to do this more than once. So it looks like some wing-clipping activities are in the future. We'd like to let them free-range, but we wouldn't have any left after a few days. Too many predators in our area.

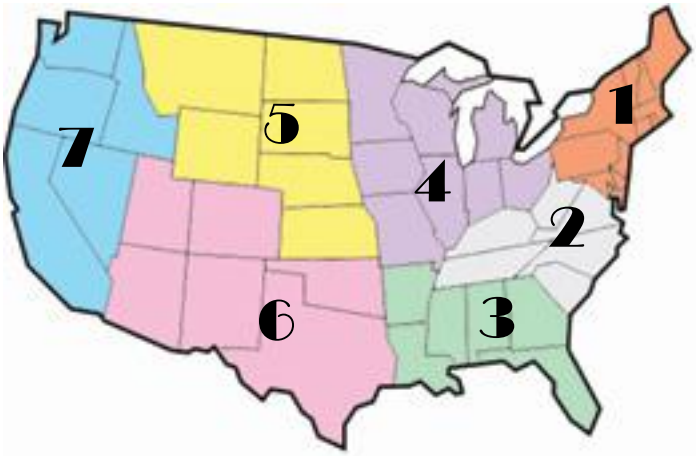
And the ducks just make us laugh everday. They travel in a bunch, quacking as they move along. Ducks just seem so happy – splashing in their pool, stretching, talking, eating. What a life, huh?

This past weekend Kim and I did something else we don't often take the time to do. We went to a concert. There is an outdoor pavillion close to us and in the Summer it's a wonderful place to be. So we went to see "Peter and Paul" of the Peter, Paul and Mary days.

About 90% of the crowd was our age or older. And Peter and Paul have aged right along with us. But if you remember those days and that music it was great fun. I felt like I should have flowers in my hair and my raggedy blue jeans on. For more than two hours we lost ourselves in the music, even getting a little teary eyed at times.

I hope you all are having a great Summer. We're home most of August, but then lots of travel again in September. Have a great Summer.

AUGUST – REGIONAL HONEY PRICE REPORT



	% Important						% Less Important					
	2014	2015	2016	2017	2018	2019	2014	2015	2016	2017	2018	2019
Price	53	55	59	66	60	61	47	45	41	34	40	39
Label Design	49	35	38	45	40	34	51	65	62	55	60	66
Name on Label	64	60	71	71	73	63	36	40	29	29	27	37
Local Honey on Label	77	66	61	55	55	60	23	34	34	45	45	40
Variety of Honey/label	19	24	23	25	20	25	81	76	77	75	80	75
Second Label	8	9	14	18	18	16	92	91	86	82	82	84
Location I sell	58	54	58	66	61	54	42	46	42	34	39	46
Time of Year	28	17	23	29	31	23	72	84	77	71	69	77
Glass Container	31	36	35	40	37	32	69	64	65	60	64	68
Plastic Container	17	19	14	16	13	18	83	81	86	84	87	82
12 oz. size	35	32	38	38	43	30	65	68	62	62	57	70
1 lb. size	60	55	48	56	62	59	40	45	52	44	38	41
2 lb. size	55	37	35	42	52	43	45	63	65	58	48	57
5 lb. size	42	36	23	27	40	26	58	64	77	73	60	74
Quart jar	45	44	45	44	46	42	55	56	55	56	54	58
Pint Jar	40	36	41	36	31	29	60	64	59	64	69	71
Specialty Jar	13	13	11	10	16	6	87	87	89	90	84	94
Gallon	-	24	15	11	25	20	-	76	85	89	75	80
Raw	-	67	67	64	67	67	-	40	33	36	33	33
Color	-	27	41	26	30	26	-	73	59	74	70	76
Other Products	-	-	2	8	13	16	-	-	98	92	87	84

For several years we have been polling our reporters on the techniques and designs they use to promote and sell their honey. Marketing isn't Rocket Science, but it does take some planning and a bit of investment to make your product both get the attention it deserves, and to stand out in the crowd if it's on a shelf with a dozen other bottles.

You can follow any trends in these and see changes, or not, over time. A couple we'd like to point to are the fact that price isn't all there is to selling honey, but it is important. Label design is less important than one might expect, and additional labels seem to not be important at all, or hardly anyway.

However, what is on the label seems, in some cases to be important. Raw and local have been important, while what variety is still not a strong component.

One thing beekeepers tell me who do a lot of one on one selling – think farm markets – is that a lot of customers don't know what Raw means, nor does Local have a good definition. A sign explaining all this is helpful they say, or a map defining where local actually is helps too. Once a customer sees this and has it explained, the next time they will know and know to ask if they don't see it. We've said before, you have to tell to sell, and this is the best opportunity you have, when you are there, and more importantly when you aren't.

One other item to note. Take a look at the $/lb column and how much you are selling your honey for in what size container. Hands down, a half pound retail container is your MOST profitable size – this month almost $10/lb, compared to $2.07/lb in a barrel. What are you putting on the shelf makes a difference…. bigger does not always mean better.

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	2.10	2.21	2.23	2.38	2.34	2.03	2.10	1.05-3.00	2.17	2.17	2.22	2.23
55 Gal. Drum, Ambr	2.00	2.15	2.16	2.35	2.00	1.87	2.00	1.35-2.50	2.07	2.07	2.14	2.08
60# Light (retail)	209.85	186.40	177.50	186.94	155.00	196.79	220.00	105.00-325.00	204.69	3.41	212.92	195.46
60# Amber (retail)	214.70	188.67	191.25	184.44	214.70	189.46	228.33	119.74-325.00	207.03	3.45	211.64	192.47
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	95.14	75.50	101.51	74.80	61.20	90.00	95.14	57.60-144.00	89.49	7.46	91.23	87.71
1# 24/case	140.81	125.32	135.45	108.69	134.00	147.66	136.20	86.40-211.20	132.82	5.53	130.13	126.79
2# 12/case	125.20	96.58	119.08	101.20	111.84	116.40	114.00	78.00-192.00	115.39	4.81	120.90	112.61
12.oz. Plas. 24/cs	111.46	101.17	100.00	91.25	83.76	110.32	103.20	66.00-175.00	102.41	5.69	104.66	99.52
5# 6/case	130.46	110.06	122.83	124.70	113.16	132.00	130.46	52.99-210.00	129.43	4.31	135.08	128.77
Quarts 12/case	159.63	154.16	136.80	142.80	151.23	169.71	144.00	109.20-222.00	153.66	4.27	158.64	151.89
Pints 12/case	110.41	93.70	83.25	82.00	111.00	90.04	84.00	60.00-192.00	94.81	5.27	90.70	99.52
RETAIL SHELF PRICES												
1/2#	5.21	4.63	4.51	4.44	3.89	4.72	6.38	1.98-9.00	4.92	9.85	4.95	4.94
12 oz. Plastic	6.96	6.14	5.66	5.01	4.58	6.25	5.90	3.50-12.00	6.17	8.22	6.09	6.12
1# Glass/Plastic	8.05	7.54	7.66	6.45	6.67	7.23	9.88	2.50-14.00	7.86	7.86	7.79	7.46
2# Glass/Plastic	13.98	12.61	13.36	11.23	11.75	11.66	15.25	6.70-23.00	13.11	6.55	13.52	12.51
Pint	12.32	10.83	9.21	8.73	10.63	9.98	10.80	6.00-22.00	10.65	7.10	10.33	10.22
Quart	21.36	17.33	15.81	15.21	17.62	18.32	18.86	9.00-40.00	18.21	6.07	18.14	17.88
5# Glass/Plastic	30.06	27.85	37.24	26.17	24.93	23.72	30.06	15.89-48.00	28.18	5.64	29.14	26.43
1# Cream	10.41	8.57	8.00	8.70	10.24	7.75	9.67	6.00-16.00	9.82	9.82	9.89	9.40
1# Cut Comb	13.50	12.99	10.39	9.60	12.67	11.25	14.00	6.00-24.00	11.99	11.99	11.51	11.61
Ross Round	9.89	7.40	9.89	9.89	9.89	10.50	12.49	6.00-13.50	10.02	13.36	9.52	9.33
Wholesale Wax (Lt)	8.16	4.78	5.75	5.77	6.13	6.30	10.50	3.00-16.00	6.81	-	6.64	6.44
Wholesale Wax (Dk)	5.55	4.38	4.18	4.17	5.55	3.00	5.55	2.00-10.00	5.10	-	5.23	5.77
Pollination Fee/Col.	95.61	77.17	71.67	90.00	95.61	95.00	67.50	50.00-160.00	86.22	-	92.39	86.96

NEXT MONTH

Welcome to NEXT MONTH, where our Honey Reporters share a line or two about what they will be doing NEXT month with their bees. Advice is given for each region so you can see what others are doing where you are, and, of course in all the rest of the regions. Check these out. These reporters are successful in business.

Region One
- Pull off honey
- Start to feed bees for Winter
- Mite control
- Check Stores in hive for Winter
- Leave the Fall flow for the long Winter
- Remove supers
- Medicate
- Check weight of hives
- Feed if lite
- Re-queen
- Feed sugar syrup
- Prepare for Winter
- Remove honey supers

Region Two
- Check for food store and feed if necessary
- Do a mite count and treat if necessary
- Clean up yard
- Check Queens
- Splits
- Feed- Dearth at this time and last month
- Downsize
- Finish mite treatments
- Feed heavy sugar syrup and combine weaker colonies
- Check for disease
- Add supers
- Check foods stores and remove honey supers

Region Three
- Late mite treatment
- Check food
- Ensure enough food
- Mite check and control
- Make sure they have enough stores
- Harvest honey
- Determine status of each hive
- Check and replace Queen as needed
- Start feeding to build Winter population
- add DFM

Region Four
- Super the hives
- Pull some comb honey
- Be sure queen is out of supers and in the brood boxes
- Mite treatment
- Feed for winter
- Check Queen health
- Re-Queen if necessary
- Combine weak hives
- Inspect your hive- verify egg, larva, capped brood, honey, pollen
- Feed supplements
- Leave extra honey

Region Five
- Keep checking mite counts
- Check brood patterns or Queen viability
- Treat for mites
- Combine
- Feed syrup and supplements

Region Six
- Feed
- Treat for mites
- Good water
- Harvest honey
- Add supers
- Remove all supers and put on supers or deeps for Winter
- Early fall oxalic acid vaporize treatment for all hives

Region Seven
- Control mites
- Feed
- Good Queens
- Check hive weight to determine if feeding is necessary
- Complete mite treatments
- Feed to stimulate egg laying

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

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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 Kim@BeeCulture.com, with BEETALK in the subject line.

Question 1

Had a strong, two-deep 10frames, hive under attack. Dozens of large blond drones were pouring into the entrance. I snatched one up and looked him over. They were big and beautiful. In my many years of having bees I have not seen this happen. I run a green drone frame in each hive. These drones were not from my hives. Why would this happen? Maybe a hot queen in the hive or just out to party! Larry Sult

You mentioned having a drone frame in each hive. How many days after installing do you check the progress of those drone cells? Remember 24 days after a drone egg is laid is the average number given for emergence of adult drones. That is not exact; it is temperature dependent. For *Varroa* control the frame must be removed before any drones emerge or you've increased your *Varroa* population. Keep careful records of the day an empty drone frame is placed in a hive and of the day to remove it, when some cells are capped but before any adults can emerge. *Ann Harman, VA*

During the swarming season drones are known to drift from hive to hive and guard bees tend to tolorate them. I've noticed however, that colonies that are queenless, have recently swarmed, or are in the process of replacing their queen, often seem to pick up a larger percentage of drifting drones than other colonies. I notice this when moving the inner cover or taking off the top honey super and see almost nothing but drones – always is a hive that is experiencing a queen change of some kind. *Ross Conrad, VT*

Drones tend to not pay a lot of attention to where home actually is when returning from mating flights, especially in mid- to late afternoon when the weather has been particularly good for flying. I've seen this response, though rarely, during high-mating season – think swarming season – though not to the extent you describe. *Kim Flottum, OH*

Question 2

And while I have your attention, another question. Do nurse bees travel with a swarm when it leaves the hive to relocate in a new place ? When a hive absconds all the bees but a tiny few are gone, at least some nurse bees must leave too.

Younger bees are found in swarms, from a few days old up to the two weeks at which they would typically forage. Presumably the oldest bees in the swarm are the ones scouting new homes. The younger bees have to retain some nurse traits until comb is drawn and the queen is able to restart egg laying. *Jay Evans, DC*

When a swarm leaves its hive, the young nurse bees and the oldest workers are usually left behind. It is a functioning colony, soon to have a new queen emerging as well as brood. Swarming is colony reproduction. Absconding is simply all the bees leaving because their hive conditions were unsuitable. African honey bees will abscond when forage is very scarce. Brood and food can be left behind. We may not discover a colony's reason for absconding. *Ann Harman, VA*

You may be confusing the terms swarm and abscond. When a swarm leaves, generally, there is little brood remaining since the queen has been restricted from laying for some time. Thus there is little need for a large population of nurse bees to remain in the former home, but to accompany the swarm to the new home. However, because some portion of bees remain to set up housekeeping again in the nest, some will be nurses, guards, drones, builders and the rest. Absconding is a totally different experience. That is when essentially all bees leave because the current nest has become – well, basically, unlivable. Mites, disease, small hive beetles, noisy neighbors, poor service from the beekeeper – any of many reasons can cause bees to leave a nest to seek a better place to live. *Kim Flottum, OH*

This question is a bit confusing to me. When a hive absconds, all the bees abandon their hive and leave. When a hive collapses from one cause or most often, a variety of causes often triggered by exposure to toxic chemicals, most all the bees are gone, but a few. With regard to swarming, it seems to me that a wide range of bees representative of all stages and jobs, leave a hive with a swarm. However, I am not aware of any research that has confirmed this or that explains how the bees that are to leave with a swarm are chosen. *Ross Conrad, VT*

Honey bees change jobs within the castes, so even if they swarmed with older bees, a forager can revert to a nurse bee if the colony requires it. Other than the caste they're born with, bee jobs are fairly flexible and change with the needs of the hive. If a colony needs more pollen foragers, they reallocate bees to that job. If they need more nurse bees, they switch with something that is not as necessary at the time. It even changes their DNA temporarily! *Jessica Louque, NC*

Question 3

What's the biology involved when a colony commits a hive bomb. That is, all the bees leave, taking *Varroa* with them, leaving behind only a few bees, and sometimes the queen, and sometimes not? Why would they do that? And, I know it's said they can

➪

invade a neighboring hive, but how, why, time of day, fighting or not? I know it's supposed to happen but I've never seen it, nobody I know has seen it. And though I sometimes see a spike in *Varroa* when checking in the Fall, I don't see a big bump in population of bees. Are there really *Varroa* bombs, or am I seeing that spike in *Varroa* population as the bee population dwindles in the Fall?

My guess is the bomb is more like a shotgun blast. Mite-infested, virus-ridden (and therefore possibly forgetful) bees go out on a trip and in some cases drift into neighboring colonies or even apiaries. No mass emergence, just a steady drain of one bee at a time. *Jay Evans, DC*

I'm not going to get entangled with discussing *Varroa* bombs. Beekeepers seem to have rather violent opinions on these. It also seems rather ill-defined. *Ann Harman, VA*

I've always heard the hive bomb theory refer to mites hitching a ride on robber bees, more than migrating on bees abandoning their hive. In theory either situation could occur, but I agree with you, in the real world it's questionable. I recently conducted a study where I had two beeyards .75 miles from each other where mites were controlled in one yard, and mites were not controlled in the other. Mite numbers grew during the season to similar numbers, but as long as the controlled yard was treated at the appropriate time of year with an effective mite control, colonies survived the Winter without issues compared to the untreated yard which lost half the hives in year one and the other half in year two. If there was any *Varroa* bomb impact, it did not seem to matter to my colonies only ¾ of a mile away, as long as the bees were cared for appropriately. Makes me wonder about the whole *Varroa* bomb theory and how well those that complain about it take care of their bees. However, my bees are in the northeast where the temperatures get cold during the Fall just when hives are collapsing from the mite. Since the bees do not fly well in cool weather, this may be what protected my hives from a mite bomb if such a thing is real. *Ross Conrad, VT*

There's the study done, I think in MD, where bees from a heavily mite infested colony were marked so you could tell where they came from, and, they were found in colonies literally miles away from home. Drifting? Leaving because they can't find home? Leaving because they don't want to go home? Whatever the reason, finding them that far from home indicates that this is a least one way mites spread from hive to hive and even bee to bee. *Kim Flottum, OH*

I've never heard it called a hive bomb, but we have colonies occasionally absconding. I can give you the reasons we've had absconding colonies. Usually it has to do with a bad location and too cold or windy, or we've had it happen when they were too close to water. I think the temperature inversion makes it too humid for the bees when they are near water. Also, we've had colonies leave behind queens, but it's usually when there were two queens to begin with. I've also had hives abscond from too much hive beetle pressure, but not usually from *Varroa.* We have a pretty good lock on our *Varroa* populations, and we don't typically see numbers over five or six *Varroa* per 100 bees. The *Varroa* population definitely spikes in the Fall as brood production slows, but that's usually when we treat. We also have some absconding from treatments that are too harsh, or even using too much Honey-B-Healthy or using a hive with too much Swarm Commander. Too much of a good thing really does exist! *Jessica Louque, NC*

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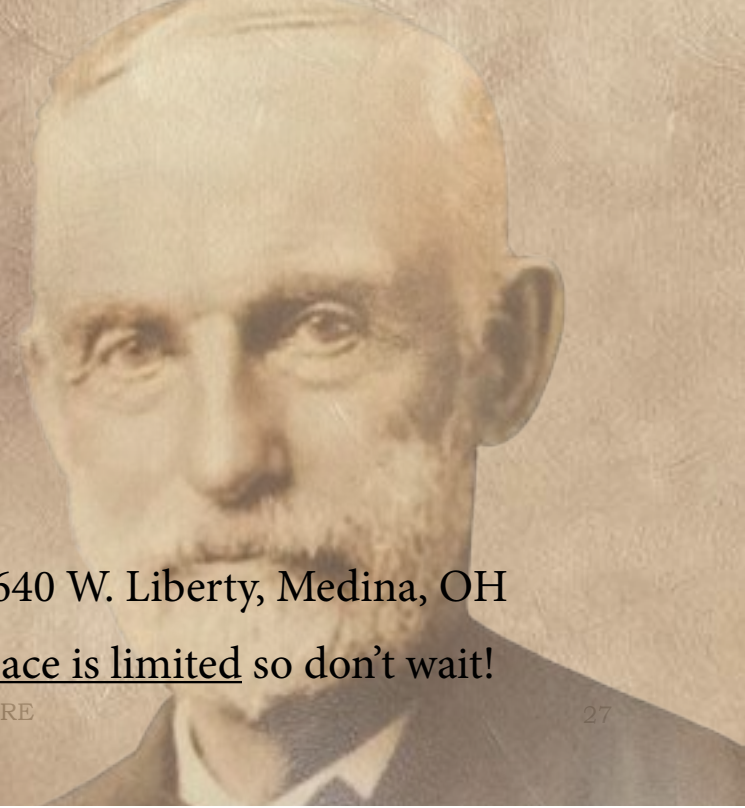

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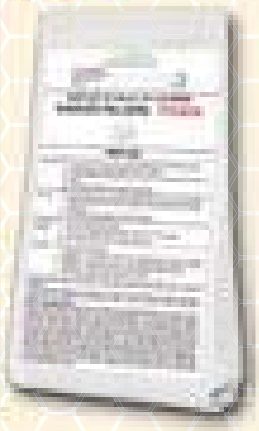

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– Psalm 41:1

THE STORY OF A.I. ROOT

Entertaining Angels Unaware

A.I. **Root**

At one time in the spring of 1878, after paying all my debts I had about $3000 in the bank. The building I then occupied was soon after sold for $4500 so that I had, subject to my demand, about $7500. Nearly all my life I had been pretty badly in debt, for just about as soon as I saw any prospect ahead of taking things a little easier, I almost invariably got hold of some new speculation, and so it went. The sum mentioned was to build the factory and pay for the ground on which it should stand.

To save expense and to enable every one to have goods with the least possible delay, I wanted the factory as near the railroad as possible. After looking at all the available land in the vicinity, some one suggested that the county fairgrounds would answer nicely if they could be purchased. The grounds sloped gently to the south and east. There were pretty patches of woodland, a stream of water, and above all, one corner of the property came right close to the railroad station, nearer than any other piece of land that could be purchased.

I made a good cash offer for the grounds, but as they belonged to the people of the county, a day had to be fixed some time ahead for the consideration of the subject. As the time for the decision came nearer, there was much talk in regard to the matter and many were quite vehement in declaring that I should not have the fairgrounds. The day finally came and with it the decision that the sale would not be made. Another meeting was held, later, however, and it was decided that I could have the property at my first offer. If the prayer for this had no effect on the people it certainly had on myself, for I felt it to be so sacred a matter that I left it all in God's hands and took no part in the talk myself, being perfectly willing to trust that what was right and best would finally result.

Raising Funds for the New Factory

The 17½ acres of land with its building cost me $3500, so I had $4000 left with which to build the factory. Trade was always dull in the Fall, and I knew from past experiences that I should run short, for with the new printing press, a new 50 H.P. engine and other expensive machinery, I feared I could not get through with less than $8000. Toward the first of September, before the roof was even on the factory, the money at the bank was all gone and what was still worse, although I had had thousands there a few months before without getting a cent of interest, I found I could get no further credit without paying 10 percent interest. Still further, I would have to have two good signers to back me, signers who were owners of real broad acres.

For years I had prided myself on the fact that I had never asked any one to sign with me, and therefore I excused myself for not signing with any one else, and I presume I had got to feeling a sort of pride in my name which was unencumbered with any responsibility for other people's debts. I became a little important and declared I would not ask any one to sign with me, but Saturday night came and the men came for their pay as usual, never dreaming that the money would not be forthcoming as it always had been. A few looked disappointed and when I learned of one who went without the necessaries of life because I had not been as prompt as they had expected, my heart smote me. Perhaps this man had just such a soft blue-eyed baby at home as I had, and it might be I had been the means of depriving this little one of comfort because the father could not have his earnings on Saturday night.

As I went home in the darkness of the night, I bowed my head to the ground under the apple trees where I had gone many times before and of Him who never refuses to go our security when we are in the right, I asked to be shown wherein I had erred and what I should do. As a natural consequence of having been refused money at the bank, I imagined that the people there treated me with a sort of lofty indifference, and my first impulse was to declare that I would have nothing more to do with them, and that I would deposit my money elsewhere. After kneeling in the grass, however, I felt that I should root out all those feelings and instead of getting mad at the cashier, I should go and state plainly to him my exact circumstances and ask his advice. This put both him and myself in quite a different light, and I found he was the same good friend he always had been. The truth of it was he had never been the least unfriendly. Do you know what a hard thing it is for a banker to refuse to trust an intimate friend and acquaintance? But, if the cashier of a bank could not do this, he would be totally unfit for his position, and would most certainly lose it.

"If you object to asking any one to sign with you," said he, "give your signers a mortgage and thus secure them from running any risk."

What a sensible piece of advice, and yet it had not occurred to me before. Furthermore, he agreed to lay my case before the bank directors and see if an arrangement could not be made

whereby I might have credit for all money taken in and be charged interest for only what I used and no more.

The arrangement was made and all that was necessary was to get two names of considerable land holders. A relative by marriage said his father would sign with me willingly, but that his mother must not be told of it. To my way of thinking, a man and wife are one and I made my request to both. The old gentleman seemed quite willing to accommodate me, but his wife whom I knew well, strongly objected. What a wicked thing it would have been to have secured her husband's name to any paper without her knowledge and to have worried her in her old age, even if she had been extreme in her ideas. God forbid that I should ever get out of trouble in that way!

I stated the matter to a member of our church who owned considerable property and although he did not refuse I saw plainly that he preferred not to accommodate me. He very kindly told me that people were talking about the probability that I would get "swamped" in trying to do things on so large a scale, because my business was something that few could understand and one that even I myself could hardly name.

I told him that I could have built a wooden building and had it all paid for, or I could have built smaller at the risk of having to build again in a year or two, or I could have purchased a smaller engine and printing press, but all these apologies would have been short-sighted in the end. Or I said, I might stop work on the building and let it stand without a roof until I could earn some more money myself.

"No, no, you must not do that. I will get you the money to pay your men tonight and we will fix it before another week so you can get along."

Do you know how much good such a friend does? My wife and I knelt together in our own room that night and asked God to tell us what to do to avoid trespassing on the good nature of any one, or making any one responsible for our own affairs. As it had been intimated that trouble might ensue if I should die suddenly, she suggested that I have my life insured for the benefit of my estate. This was done and a mortgage given, the signers being my father and a friend who had for many years been the superintendent of our Sunday school.

Paying for the Brick on the New Building

One Sunday late in 1878, the last hymn sung at church was "Jesus, I my cross have taken, All to leave and follow thee." These lines kept ringing in my ears and the words followed me all through the week. My money matters were not all quite adjusted and one considerable bill had been presented that I was not able to meet. On Thursday the man who had furnished the brick for the new building said he had a balance due to him, and he must have it, and that was all there was to it. I asked the bookkeeper how much there was due him.

"Three hundred and twenty-three dollars and thirteen cents."

"Mr. S., at just what day or hour must you have this?"

"I must have it on the 20th without fail."

"All right, you shall have it."

After he had gone the bookkeeper said:

"We will not pay the hands then today?"

"Yes pay them all."

"But how will you meet all these demands if you do?"

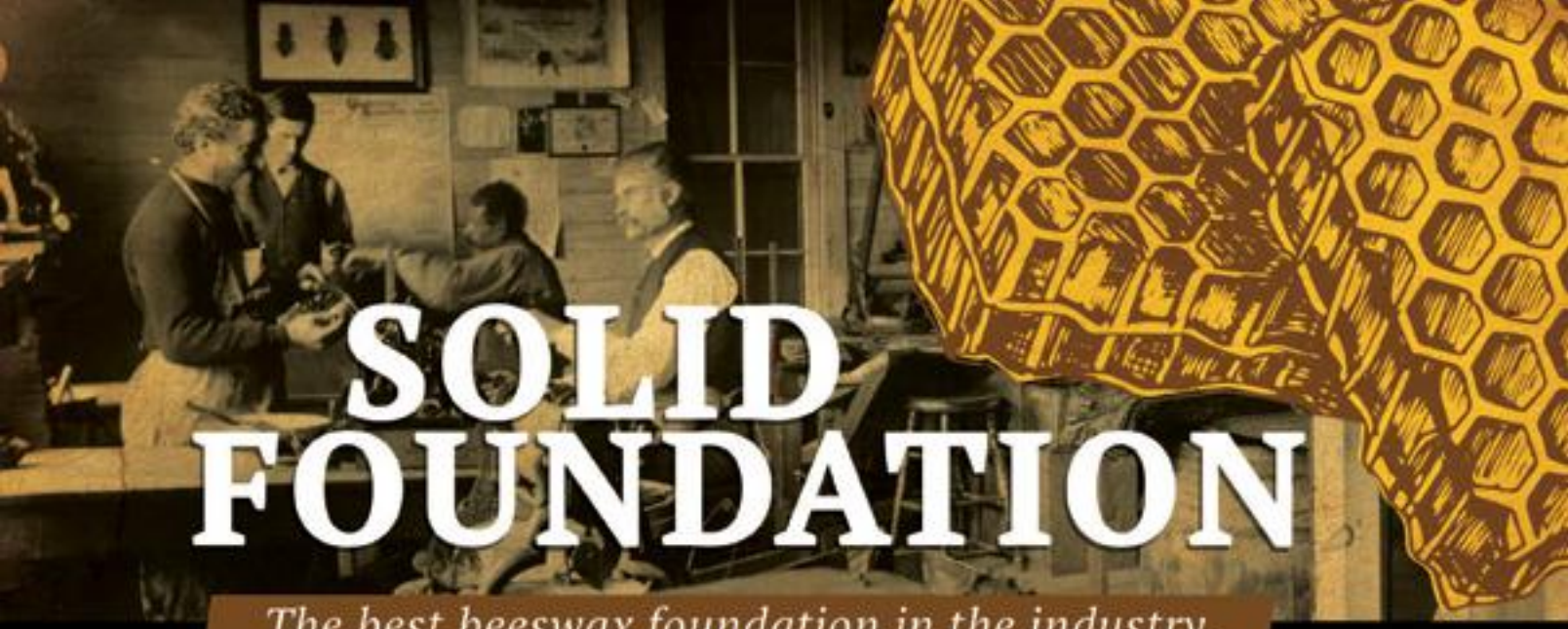
Before I went to bed that night I told my wife all about it. I confess I began to suspect that some of my friends feared if they did not crowd me a little and get their money pretty soon, perhaps they might not get it at all. Suppose they should all hand in their bills as did the brick man and say they must have the money immediately? Said my wife:

"What would you do if they should?"

"Ask God to send the money or tell us how to get it as we have before."

"But perhaps you are not doing right. I am not at all sure that God wished you to get in debt this way, and I can not think that it is right to keep so many at work when you can get along very well without them. As far as they are concerned, you are doing them little if any good, in spite of all your efforts at making them better.

"All to leave and follow me," came into my mind, and I asked God to give me a plain evidence of his approval, by sending the money to pay those bills if it was his wish that I



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should go on as I had been doing.

This was on the 12th day of December. The next morning a visitor from quite a distance came in, and although I had been up and at work long before daylight, my work, writing especially was so much behind that I felt almost like refusing to stop. He was a very pleasant man, however, and I wanted to show him over the factory. Things were not going very well, and when we went into one room and found dirt and disorder, it tried me exceedingly.

As we walked along I tried to talk cheerfully, but it was only assumed. Finally, I said, "My friend, I am cross today. I was going to take considerable pride in showing you around, but I have been very much humbled."

We started to go over to the apiary. Said my visitor, "Mr. Root, I wish to take a little liberty, and I may ask you some questions you may not care to answer."

I told him I had no secrets in the world, and that he could ask me anything he liked.

"How much are you in debt?"

I told him as nearly as I could without going to the books.

"How much interest do you pay? Are there others connected with you in any way that would be involved if you had bad luck?"

"Only two people have undersigned me, and they are secured by mortgages as well as by an insurance on my life. I could get the money lower, but I should have to get signers and I do not wish to have my business in any such shape that a bad move on my part might involve others."

He approved of this, and finally said, "Have you any bills coming due very soon that may trouble you to meet?"

I could not help looking at him in surprise at this, and he apologized, saying perhaps he was going too far. I assured him he was not and then continued.

"No," said I, "I have some bills to meet that trouble me some, especially the balance I owe the man who made the brick for my building."

"Well," said he "I have a proposition to make you and I hope you will be frank to say if you do not wish to accept it."

"There," I thought, "I see through it all now. He wants to join in partnership with me." You see I did not even then have faith enough to see the connection between this conversation and the prayer of the night before. His next words, however, opened my eyes and it all became plain.

"If it will be of service to you, I will send you $500 and you may keep it a year at 7 per cent. I will require no security, only your note of hand."

"But why do you, an utter stranger trust me thus? How do you know I will not make a foolish use of the money and get us all into trouble?"

"Well, I think you are trying to do good and I want to help. I have been reading your 'Home Papers' for a few months and I got to thinking about it and wondering whether you might not be in need of a friend just about now. The more I thought about it, the more I thought I would like to come and see if a little money would not do you good rather than harm. I have seen you and am satisfied."

I thought of the strange intertwining of events, of the lines of that hymn, of my frankness in telling him how annoyed I was about the disorder in the wax room. I thought, too, of what the Bible says of *entertaining angels unaware*, and how uncourteously I had treated visitors many times. I saw clearly that God was in it all, and I almost felt frightened as I realized how near He had been to me. Unless I lived a purer and better life, I felt almost afraid to take that money so manifestly from God's own hand. I told my friend that God had sent him to me in answer to prayer. He did not dispute it, although he made no profession of religion.

I told of this circumstances at our prayer meeting and on several other occasions. A great many inquired if the money had come, and when I told them it had not, most of them replied that they would like to see it before they were convinced. Some thought it some new confidence game, and that I would be the loser in some way. Finally, I told some of them I would bring the check over and show it to them before the day I had agreed to pay the man for the brick. I stopped at my mother's and told her. She, of course, had a faith like mine, but father said something would happen to prevent its reaching me in time. He thought the man might be taken sick, or the mails stopped by deep snows.

The cashier of the bank said it was a wonderfully strange thing, and asked if the man had not some selfish purpose in view. He asked if he did not carry away something, and said he had seen him with a package under his arm. I told him that the man had taken some goods, but had paid for them all.

By Thursday noon a letter came from a bank at least 1000 miles away containing a check for $500 in gold. In a letter received from my kind friend a day or two before, he said, "I hope you may meet your brick man with a smiling face next Thursday."

The brick man came at the appointed time, and I judged from the expression on his face that he feared he would be disappointed. To be sure I could meet him with a smiling face and as we walked to the bank I told him of how God helped those who trusted him. BC

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A Closer LOOK

PROPOLIS COLLECTION AND USE

Clarence **Collison**

Honey bees collect antimicrobial plant resins from the environment and deposit them in their nests as propolis.

Honey bees produce propolis (also called bee glue) from resins that they collect from different plant organs and with which they mix beeswax. The term "propolis" is of Greek origin: "pro" meaning "in front of/for" and "polis" meaning "city," that is, in front (or for defense) of the city (Bankova et al. 2019). Propolis is used by bees as a building material in their hives, for blocking holes and cracks, repairing combs, and strengthening the thin borders of the comb (Ghisalberti 1979). A feral colony nesting in a tree cavity coats the entire inner walls with a thin (0.3 to 0.5 mm) layer of propolis forming what has been termed a "propolis envelope" around the nest interior (Seeley and Morse 1976). Propolis is continually added to the nest walls during colony development and is first placed at areas prior to comb attachment, which not only creates a clean, smooth surface, but may also reinforce new comb (Seeley and Morse 1976; Visscher 1980). Propolis plays the role of chemical defense against microorganisms and as an embalmer of larger, dead intruders (insect, small animals) that have died in the hive and are too large to be removed by the bees (Ghisalberti 1979).

Propolis is not collected at all times of day, nor in all weathers. The main period of collection lies between 10:00 a.m. and 3:30 p.m., most being collected before noon. Bees prefer to collect it in sunny places, because the propolis there is softer and more easily broken off. In contrast to most pollen packing, which is done in flight, the propolis loads are packed while the bee is in a sitting position. The process of collecting a particle of propolis from the source and packing it into the corbicula (pollen basket) can be divided into four basic steps: 1) Break off a particle of propolis with the mandibles; 2) work it with the mandibles and take it to the forelegs; 3) transfer it from the forelegs to one middle leg: 4) transfer it from the middle leg to the corbicula (pollen basket) on the same side. This sequence is repeated until there is a full resin load on both corbicula (Meyer 1956). After completing the four steps, bees have been observed flying around for a few seconds above the resin source, then landing again to add more to each to each corbicula (Alfonsus 1933; Haydak 1953). The purpose of these flights is unknown but may be used to assess the weight of the current corbicular load (Simone-Finstrom and Spivak 2010).

The process of obtaining a full corbicular load of resin has been noted to take about seven minutes (Teixeira et al. 2005; Kumazawa et al. 2008), but can take from 15 minutes to an hour depending on the weather (Haydak 1953). Once the bee has a full load, she returns to her colony to unload the resin from her corbiculae. The unloading process typically takes approximately 15 minutes, but can extend from one to seven hours or even overnight (Alfonsus 1933; Haydak 1953; Ratnieks and Anderson 1999; Nakamura and Seeley 2006).

A resin-forager cannot unload her corbiculae herself, but rather must rely on her nestmates to take the resins off of her. Once the resin forager returns with a full load, she will go to a site within the hive where propolis is needed, where she waits until other bees, known as cementing bees, bite off chunks of resin from her corbiculae (Alfonsus 1933; Haydak 1953; Meyer 1956; Nakamura and Seeley 2006).

In temperate regions, it is thought that the main source of resins are *Populus* (Poplar, Aspen, Cottonwood), *Betula* (Birch), and *Alnus* (Alder) species, although others are used by honey bees less predominately (Ghisalberti 1979).

The chemical composition of propolis is quite complicated. More than 300 compounds such as polyphenols, phenolic aldehydes, sequiterpene quinines, coumarins, amino acids, steroids and inorganic compounds have been identified in propolis samples. The contents depend on the collecting location, time of year and plant source. Consequently, biological activities of propolis gathered from different phytogeographical areas and time periods vary greatly (Lotfy 2006).

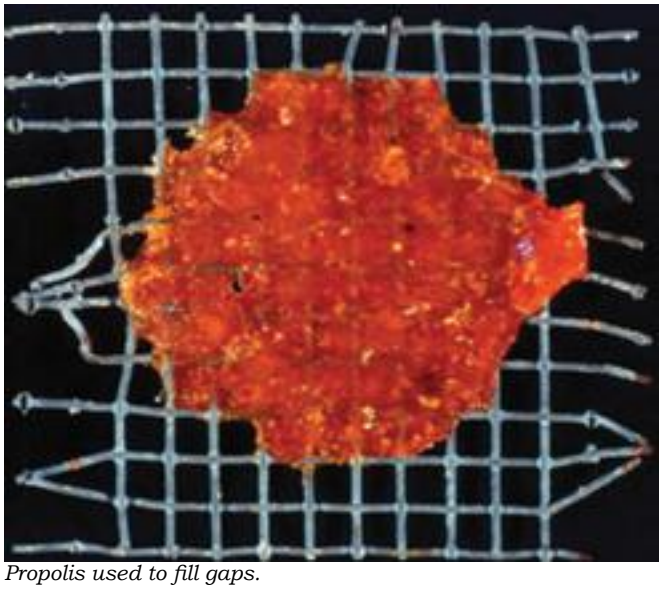
Honey bees are constantly dealing with threats from pathogens, pests, pesticides and poor nutrition. It is critically important to understand how honey bees' natural immune responses (individual immunity) and

In temperate regions, it is thought that the main source of resins are Populus (Poplar, Aspen, Cottonwood), Betula (Birch), and Alnus (Alder) species.

collective behavioral defenses (social immunity) can improve bee health and productivity. Social immunity describes how individual behaviors of group members effectively reduce disease and parasite transmission at the colony level. One form of social immunity in honey bee colonies is the collection of antimicrobial plant resins and their use in the nest architecture as propolis (Simone-Finstrom and Spivak 2010; Simone-Finstrom et al. 2017).

Simone et al. (2009) investigated the effect that resins in field colonies of honey bees have on the immune system of an individual honey bee. They hypothesized that the presence of propolis within the colony reduces the amount or diversity of pathogenic and saprophytic microbes within the nest and thus results in a lowered physiological investment in the production of antimicrobial peptides and cellular immunity in bees throughout the colony. Humoral defenses (i.e. antimicrobial peptides) and cellular defenses (i.e. melanization, phagocytosis, and encapsulation) are known to be produced in response to infection and wounding (Evans 2004). As a chronically high activation of the immune system at the individual level can lead to decreased productivity at the colony level (Evans and Pettis 2005), factors that reduce immune investment could lead to increased productivity.

Honey bees collect antimicrobial plant resins from the environment and deposit them in their nests as propolis. This behavior is of practical concern to beekeepers since the presence of propolis in the hive has a variety of benefits, including the suppression of disease symptoms. To connect the benefits that bees derive from propolis with particular resinous plants, Wilson et al. (2017), determined the identity and botanical origin of propolis compounds active against bee pathogens using bioassay-guided fractionation against the bacterium *Paenibacillus larvae*, the causative agent of American foulbrood. Eleven dihydroflavonols were isolated from propolis collected in Fallon, NV, including pinobanksin-3-octanoate. This hitherto unknown derivative and five other 3-acyl-dihydroflavonols showed inhibitory activity against both *P. larvae* (IC_{50} = 17-68 µM) and *Ascosphaera apis* (IC50 = 8-23 µM), the fungal agent of chalkbrood. A structure-activity relationship between acyl group size and antimicrobial activity was found, with longer acyl groups increasing activity against *P. larvae* and shorter acyl groups increasing activity against *A. apis*. Finally, it was determined that the isolated 3-acyl-dihydroflavonols originated from *Populus fremontii*, and further analysis showed these compounds can also be found in other North American *Populus* spp.



Propolis used to fill gaps.

Social insects have evolved colony behavioral, physiological, and organizational adaptations (social immunity) to reduce the risks of parasitization and/or disease transmission. The collection of resin from various plants and its use in the hive as propolis is a clear example of behavioral defense.

For *Apis mellifera*, an increased propolis content in the hive may correspond to variations in the microbial load of the colony and to a down regulation of an individual bee's immune response. However, many aspects of such antimicrobial mechanisms still need to be classified.

Assuming that bacterial and fungal infection mechanisms differ from the action of a parasite, Pusceddu et al. (2019) studied the resin collection dynamics in *Varroa destructor*-infested honey bee colonies. Comparative experiments involving hives with different mite infestation levels were conducted in order to assess the amount of resin collected and propolis quality within the hive, over a two-year period (2014-2015). Their study demonstrates that when colonies are under stress because of *Varroa* infestation, an increase in the number of resin foragers is recorded, even if a general intensification of the foraging activity is not observed. A reduction in the total polyphenolic content in propolis produced in infested versus uninfested hives was also noticed. Considering that different propolis types show varying levels of inhibition against a variety of honey bee pathogens in vitro, it would be very important to study the effects against *Varroa* of two diverse types of propolis from *Varroa*-free and from *Varroa*-infested hives.

The effects of the propolis envelope as a natural defense against *Paenibacillus larvae*, the causative agent of American foulbrood (AFB) disease was tested. Using colonies with and without a propolis envelope, Borba and Spivak (2017) quantified: 1) the antimicrobial activity of larval food fed to one to two day old larvae; and 2) clinical signs of AFB. Their results show that the antimicrobial activity of larval food was significantly higher when challenged colonies had a propolis envelope compared to colonies without the envelope. In addition, colonies with a propolis envelope had significantly reduced levels of AFB clinical signs two months following their challenge. Their

Propolis stimulates high-level expression of the immune system response in bees challenged with microorganisms.

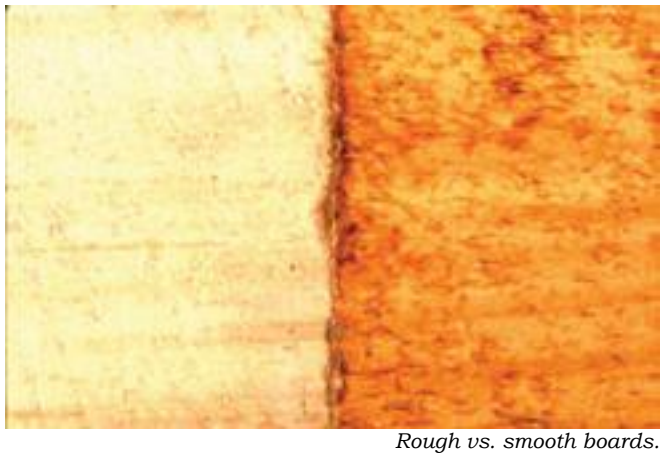
Colonies with a propolis envelope had significantly reduced levels of AFB clinical signs two months following their challenge.

results indicate that the propolis envelope serves as an antimicrobial layer around the colony that helps protect the brood from bacterial pathogen infection, resulting in a lower colony-level infection load.

Numerous papers have shown that propolis contributes favorably to worker honey bee immune response and colony social immunity. Moreover, resin-foraging specialists are more sensitive than pollen foragers to tactile information in the nest interior, and they respond to these stimuli by collecting more resin. Hodges et al. (2019) showed that in-hive propolis deposition is increased compared with nonmodified controls, with any one of the three methods for increasing textural complexity of hive wall interior surfaces: 1) plastic propolis trap material stapled to wall interior, 2) parallel saw kerfs cut into wall interior, or 3) roughening wall interior with a mechanized wire brush. Pairwise comparisons showed that propolis deposition was not significantly different among the three textural treatments; however, textural treatments interacted with time to show a more consistent benefit from plastic propolis trap material or roughened interior surface over saw kerfs. Although direct health benefits were not measured, this work shows that it is comparatively simple to increase propolis deposition above background levels by increasing textural stimuli in hive interiors.

Self-medication plays a major role in the behavioral defense against pathogens and parasites that animals have developed during evolution. The conditions defining this adaptive behavior are: 1) contact with the substance in question must be deliberate; 2) the substance must be

Closing the gaps.



Rough vs. smooth boards.

detrimental to one or more parasites; 3) the detrimental effect on parasites must lead to increased host fitness. Recent studies have shown that *A. mellifera* colonies are able to increase resin foraging rates when infested by *V. destructor*, whereas, further investigations are needed for evidence of parasite and host fitness. In order to understand whether *Varroa*-infested colonies could benefit from increasing levels of resin, Pusceddu et al. (2018) carried out laboratory bioassays to investigate the effects of propolis on the fitness of infested workers. The longevity and energetic stress of adult bees kept in experimental cages and artificially infested with the mite were thus monitored over time. At the same time, in vitro experiments were performed to study the contact effects of crude propolis on *Varroa* mites. Their results clearly demonstrate the positive effects of raw propolis on the lifespan of *Varroa*-infested adult bees. A low narcoleptic effect (19-22%) of raw propolis on phoretic mites after five hours was also observed. In terms of energetic stress, they found no differences between *Varroa*-free and *Varroa*-infested bees in terms of the daily sucrose solution demand. Their findings seem to confirm the hypothesis that resin collection and propolis use in the hive represent an example of self-medication behavior in social insects.

Among their natural defenses against pathogens and parasites, honey bees coat nest cavity surfaces with propolis. Consequently, they are able to economize on immune system activation, lowering energetic costs and improving longevity. However, the mechanisms through which propolis acts to protect bees are unknown.

Before the city.

Turcatto et al. (2018) showed that 0.1% propolis fed in a pollen substitute diet greatly increases activation of antimicrobial peptide genes (defensin-1, abaecin, hymenoptaecin, and apidaecin) in bees injected with *Escherichia coli* (a bacterium), compared to infected bees fed the same diets without propolis. This increase was not seen in uninfected bees fed propolis. In addition to its protective role in the hive, propolis stimulates high-level expression of the immune system response in bees challenged with microorganisms. Whether this increase translates into improved disease control will require further laboratory and field tests with pathogens. BC

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INFORMATION LITERACY FOR BEEKEEPERS

Eleanor **Andrews**

Honey bees are the best teacher. Or so they say. Unfortunately, mine don't speak English, and I can be a little dimwitted, so I have to figure out most things some other way. I'm not the only one, though: at the Greater New York Bee Conference in March, speaker Phil Craft mentioned **Google Scholar** as a useful source of high-quality information, and I saw lots of people in the audience taking notes. That's when I began to think more about how we as beekeepers find, evaluate, and use information. I'm finishing up my PhD at Cornell University, where I think a lot about similar questions: how to make the most of library resources, judge the credibility of particular references, read scientific literature, and share information responsibly. This is the core of "information literacy," which is as much a part of my beekeeping toolkit as my smoker or hive tool.

A librarian once told me that the smartest way to start researching a topic is by talking to someone knowledgeable. Like many of us, I rely on the people in my club: Peter Borst, who's forgotten more about beekeeping than I'll ever learn; David Hopkins, who volunteers at Cornell's Dyce Lab for Honey Bee Studies and always has something thoughtful to say; Shelley Stuart, who models how to squeeze bees into a full life; and other generous officers and members, too many to name here. But, as the saying goes, ten beekeepers might have eleven opinions — and, more to the point, some of those opinions might be wrong. How do I assess a given beekeeper's authority and credibility? Their years of experience? That's a reasonable starting place, but limited, if they've just done the same thing year after year. Their success in keeping their colonies healthy and productive? That's super important – but it can feel like prying to ask. Education level? Formal education doesn't necessarily seem relevant, although beekeepers with more formal education may be able to draw on a wider range of resources. Informal measures, like Master Beekeeping certifications show that someone has made an ongoing effort to learn more, which is probably important regardless of what program it is (the Eastern Apicultural Society, Cornell, other universities). In sum, I'm not usually comfortable making a call on how credible a fellow beekeeper is, so I usually end up back in the books.

When I have a particular question, I might look at a textbook, like Dewey Caron and Larry Connor's *Honey Bee Biology and Beekeeping*. And someday I'll spring for the latest edition of *The Hive and the Honey Bee*. But I often head over to (regular) Google, too – with some trepidation. I have to think carefully about how to phrase my query, and try a few different combinations. This illustrates the idea of "Searching as Strategic Exploration" (from a **document** by the Association of College and Research Libraries (ACRL) on information literacy): "searching for information is often nonlinear and iterative, requiring the evaluation of a range of information sources and the mental flexibility to pursue alternate avenues as new understanding develops." In other words, searching itself is a skill, and searches need to be repeated and refined multiple times. As an example, I've heard that I can encourage my bees to collect more propolis and therefore boost overall hive health/immunity, if I staple screens to the inside of the hive. But I don't really know how best to do it. So I Google *propolis staple screen*. But that gets me results about travel screens and propolis traps – not very useful. So I try *propolis staple screen inside of hive*, to find more targeted information. Most of the results are still not very useful, but I see a hit about propolis envelopes that rings a bell, so I try *"propolis envelope" screen* (the quotation marks mean that the two words are searched for as one phrase) and now I've got a mix of reasonably useful stuff from a range of sources: *Nature* (scientific journal), Bee Informed Partnership (high-quality national research team), ResearchGate (repository of scholarly articles), Beesource (unmoderated forum), Honeybee Suite (blog and wide-ranging website), Reddit (self-moderated forum), Basic Beekeeping (blog), and more.

The next step is evaluating these sources. Which of these is most reputable? Anything I run across that doesn't come from a clearly credible, high-quality source, I take with a grain (or generous scoop) of salt. Happily, the language of the "propolis envelope" pulled up more scholarly stuff than usual (namely the first

three sources in the list above); for other searches, my results pages are mostly made up of Beesource threads, YouTube videos, and blogs. If there's an extension website, I'll start there – being sure to ask myself which information on, say, the North Carolina extension website is still relevant in upstate New York, and which isn't. More broadly, I stick to who has authority in a given area. If I want to know about queens, I look for work by Dave Tarpy. If I want to know about propolis, I look for work by Marla Spivak. If I want to know about breeding and genetics, I look for work by Sue Cobey. I mostly skip blogs, ever since I ran across a photo of a new beekeeper proudly displaying a frame of brood – with evident signs of foulbrood. But if most of the search results are blogs, I might open up a couple and skim through them – never just one, since I'm looking for common threads. That way I can pull out some general principles, rather than specific procedures.

Occasionally, I look at scholarly, peer-reviewed journal articles, although they're less helpful for beekeeping how-to's and more useful for understanding issues in biology and toxicology, like the effects of certain pesticides or the genetic dimensions of health and immunity. To continue the example of the propolis envelope, I see in my search results a scientific article describing a study testing the efficacy of the propolis envelop against American foulbrood. Entomological or biological articles are as difficult for me to read, as they are for anyone without much training in the STEM fields (science, technology, engineering, and math). But I can tell from the article that there were measurable benefits from those traps, and I don't really need to know much beyond that. In general, I look for scientific articles intended for a broader audience and therefore written more accessibly, such as those in *Nature* or *PLOS One* or other top-tier general scientific journals (even *Scientific American*). Literal access is important, too: because of my affiliation with Cornell, I can download articles from behind a paywall for free. But most people can't. If you find the abstract of a paywalled article that you want to read, check with a reference librarian at your public library. Anyway, in this study, I can see from their methods that they stapled commercial traps to the inside of their hives, which should be easy enough for me to do (although I'm kind of a cheapskate, so the next search is on whether I can rig something up myself). Note that scientific studies are generally only able to make claims about one specific thing, in this case, AFB. Scientists can't run a rigorous experiment unless they narrow the scope of their research to just one or two specific variables and control for everything else. It can feel limited, but that's just how good science works.

In looking for answers to some of my questions, I might end up in a popular science article, such as something from *National Geographic*, but the tradeoff for readability is that these articles can be alarmist or misleading. I often find myself shaking my head in disagreement: some of the regular contributors to *Mother Jones*, for example, sensationalize the risks of pesticides, while on the other "side," contributors to the *Genetic Literacy Project* and the American Council on Science and Health website tell only partial truths as well. There is a lot at stake around issues like these, which makes it even harder to know who to trust. But I don't always like to talk about "sides": honey bee health is subject to many factors and it makes sense to prioritize different factors in different conversations. Again, my rule is to skim a few articles about the same topic, to find commonalities. I also trace any news articles about recently published scientific studies back to their original source, where, even if I can't figure out the particulars, I can tell whether the article has been described accurately or hyped up.

Finally, I mostly use a more passive approach to build my knowledge of beekeeping and keep up with news and research. That helps me know where to look later on, if I want to learn more about a particular topic. In my inbox, there's *Bee Culture's* "Catch the Buzz" updates, ABJ-Extra updates, messages on my club's list-serv, and occasional emails from Randy Oliver's Scientific Beekeeping list-serv. On Facebook, I'm in a few local/New York bee club groups, and I follow the Cornell Dyce Lab and the Bee Girl (Sarah Red-Laird). One of the most valuable tools in this regard has been the daily digest of **BEE-L**, a list-serv that connects hundreds of experienced and thoughtful beekeepers, mostly in the U.S. This is a prime example of the ACRL's idea of "Scholarship as Conversation," where "communities of scholars, researchers, or professionals engage in sustained discourse with new insights and discoveries occurring over time as a result of varied perspectives and interpretations." Many contributors to BEE-L are unwilling to accept assumptions and conventional wisdom, instead delving into the nitty-gritties of how we know what we (think we) know about bees and beekeeping, all the hows and whys. There are rarely definitive answers, but instead a suite of well-reasoned queries, observations, conjectures, and more.

There are some things I still don't understand well, because the available information is muddied by exaggerated claims or complicated science or conjectures that are difficult to prove. These include apitherapy (my current understanding: effective only for a very narrow range of ailments),

honey as a inoculant against local allergies (my current understanding: unlikely), and the local adaptation of honey bee populations (my current understanding: possible over long time frames, but unlikely in most places in the U.S. today, given the movement of hives around the country). Notice I say "current" understanding: I expect my thinking to evolve over time as I learn more – since the truest thing ever said about beekeeping comes from the well-known authority on honey, Winnie-the-Pooh: "you never can tell with bees." (I am grateful to Jim Fischer for pointing me to this nugget.) There will always be debates and gray areas; that's what makes learning about bees a lifelong endeavor.

In the end, I almost always have more questions. But that's okay: the ACRL describes "Research as Inquiry": "research is iterative and depends upon asking increasingly complex or new questions whose answers in turn develop additional questions or lines of inquiry in any field." In other words, it's about the process: having conversations, being open to new information, examining our assumptions, finding a balance between respecting expertise but being skeptical, staying humble, and learning to ask more and better questions along the way.

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Honey Bees Don't Get To Pick Their Poison

Christopher **Mayack**

Exposure To Multiple Pesticides Appears To Be Quite Pervasive And Spans From Rural To Urban Areas.

Many beekeepers I interact with on a regular basis know that bees exposed to low levels of pesticide in the environment, low enough so that they will not die from them immediately, are still having a major impact on honey bee health. But which pesticides are having the greatest adverse impact? Does the amount of exposure matter? What about how many pesticides a honey bee is exposed to at one time? Does this play a role in the most recent honey bee health decline as well? What do the impacts of other stressors, such as parasites and lack of nutrition have, if any, that adversely impact the health of honey bees, either independently or in concert with pesticide exposure?

Recently, researchers applied the exposome paradigm to measure the myriad of chemical exposures at the hive level, in the context of a case-control study defined by the presence or absence of infection with *Nosema ceranae*. This study was recently published in the journal **PLOS ONE** by a team of scientists from Haverford College, Sabancı University, Johns Hopkins University, and Agilent. It was determined that 20 xenobiotic pesticides were observed a total of 143 times, across 30 different bee hives, in 10 different apiaries, sampled longitudinally at three time points. Eighteen out of 20 of the identified pesticides were measured in the infected hives, while 10 out of 20 were measured in the uninfected hives. Based on these findings, the authors concluded that exposure to multiple pesticides appears to be quite pervasive and spans from rural to urban areas.

Although pesticide exposure from agricultural practices should be of concern for beekeepers, this study demonstrated that insecticides, herbicides, and fungicides primarily used on crops make up less than half of the beehive exposure events, suggesting that a more holistic perspective is needed when routes of exposures are considered. For example, the most pervasive chemical exposure that was found in nearly all hives was naphthalene. The pervasiveness of this chemical is perhaps not surprising as sources of naphthalene include human activities such as gas engine combustion, aircraft emissions, cooking, and residential wood burning. In 2011 alone in the New England area, more than 527 tons of naphthalene were emitted. Naphthalene was previously used by beekeepers to control beeswax moth, but it is now banned because it has been shown to accumulate in beeswax. Dr. Robert L. Broadrup, a professor at Haverford College and the study's first author, suggests "if the number of pesticide exposures is what is associated with higher disease prevalence as demonstrated in our study, then the effects of all pesticide exposures, not just neonicotinoids, should be carried with a more equal weight."

To investigate how pesticide exposures may combine with other stressors to affect bee health, the researchers looked for associations between pesticides and common honey bee pathogens. *Nosema ceranae* is a microsporidian gut parasite also implicated in the decline of bee health. Using *Nosema ceranae* infection as an example of how pesticide exposures may be associated with other bee health stressors, the authors found that it is not a single, particular pesticide, or the relative amount of the exposure, but rather it is the number of different pesticide exposure events that are associated with a higher prevalence of a *N. ceranae* infection in a given hive. Even when grouped by chemical category, the relative level of a given exposure was not associated with the *Nosema* infection load.

According to one of the co-authors of the study, Dr. Christopher Mayack, a professor in the Faculty of Engineering and Natural Sciences at Sabancı University, stated "the fact that the number of pesticides and not the relative amount of any given pesticide was associated with a *N. ceranae* infection was a very surprising finding for us. This goes to show that we now know that bee health stressors interact, but mechanistically how one is associated with another to produce a synergistic decline in bee health, in the natural environment, remains elusive".

Metabolic pathways, essential for maintaining life, are likely to hold the answers for how stressors interact to

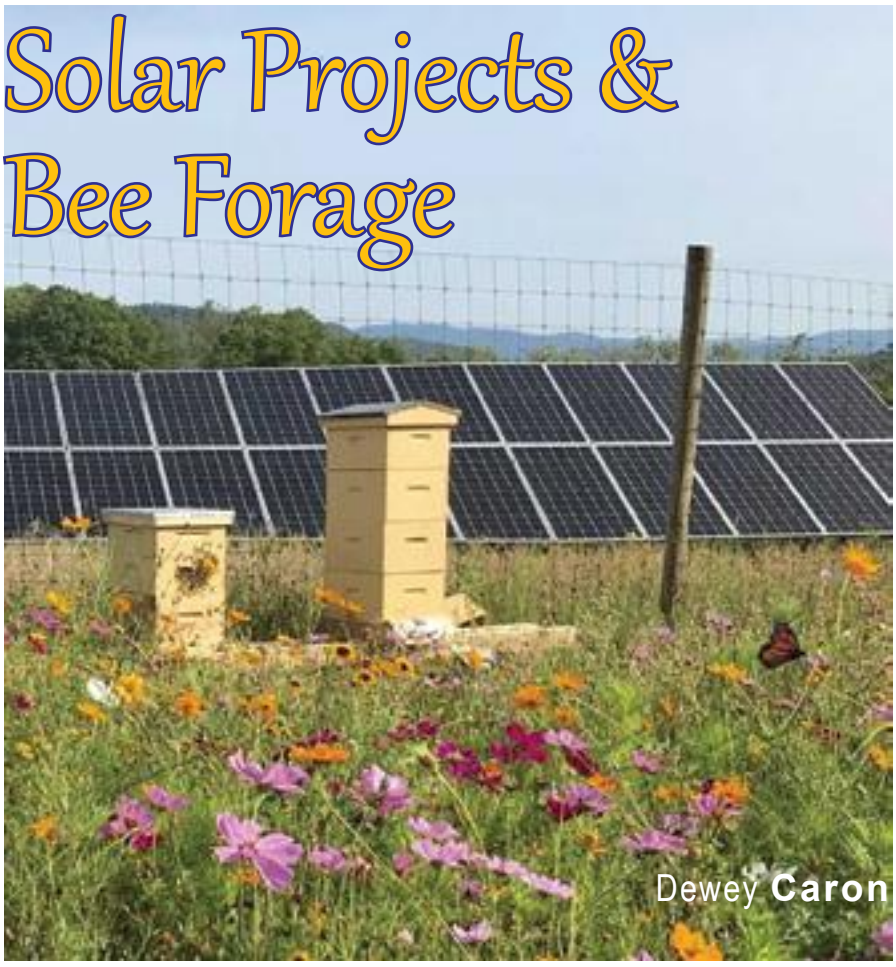
produce a synergistic decline in bee health. The study identified a total of 2,352 different chemicals of which 14 were associated with a *N. ceranae* infection and the disruption of nine honey bee metabolic pathways. The authors further identified multiple locations along the identified pathways disrupted by *N. ceranae* infection, pesticide exposure, or both. Interestingly, *N. ceranae* – like some pesticides – is also known to disrupt metabolic activity. The potential biological effects of the metabolic disorders documented in this study range from a lowering of immune function, to the lowering of brood food quality, to the disruption of pheromone communication, to a loss of anti-microbial activity in brood food, to the lowering of the bees' detoxification ability, to the lowering of royal jelly quality, to the disruption of nest-mate recognition. Beekeepers and scientists alike can, therefore, see how these stressors may erode bee health and the functioning of a bee colony.

The metabolic pathway of a given pest is often the target of a pesticide, but many biological pathways are similar across many different organisms, so they could potentially harm non-target organisms. The additional fact that metabolic pathways across organisms use similar enzymes to carry out life processes creates the opportunity for undesired effects from pesticide exposure. Indeed, the authors found that one pesticide, Azobenzene, is likely to disrupt an enzyme along the Krebs cycle, which is central to all metabolic activities, including fatty acid metabolism. Furthermore, *N. ceranae* infection is likely to disrupt another metabolic enzyme, Hexadecanoic acid, within the fatty acid metabolic pathway, thereby delivering a "one-two punch" overwhelming metabolic functioning of the honey bee, and increasing their susceptibility to disease.

As this study demonstrates, honey bees are consistently exposed to pesticides and other chemicals from a variety of sources in rural, urban, and in-hive environments. It further reveals how pesticide exposures can potentially combine, with common honey bee pathogens, to increase susceptibility to further infection. The changes in the affected bees' metabolic functioning lead to a higher likelihood to be exposed to more chemicals with negative effects which in further increases the bees' susceptibility to infection, and ultimately, the decline of hive health. The complex relationship between environmental exposures and the biology of the honey bee calls for a more holistic perspective of stressors from both the beekeepers and the scientists as they work together to improve honey bee health. BC

Research paper: Broadrup RL, Mayack C, Schick SJ, Eppley EJ, White HK, Macherone A (2019) *Honey bee* (Apis mellifera) *exposomes and dysregulated metabolic pathways associated with* Nosema ceranae *infection.* PLoS ONE 14(3): e0213249. **https://doi.org/10.1371/journal.pone.0213249**

Solar Projects & Bee Forage



The National news picked up the potential conflict in Oregon between solar energy arrays being developed on agriculturally-zoned lands. Beekeeping and providing potentially greater bee forage may represent his conflict solution.

The story concerned a 73-acre solar project near Estacada in Clackamas County (close to Portland in the northern end of the Willamette Valley). Pacific Northwest Solar LLC requested an exemption to build the solar farm on agricultural land. To qualify as ag land use, the project developer planned on establishing 100 beehives on the property, planting "bee-friendly forage" around the panels and "shade resistant native plants" beneath the solar panels. **http://www.capitalpress.com/Oregon/20180608/beehive-solar-project-draws-opposition**

Oregon, as in most states, has seen the one-way conversion of agricultural land to housing developments, golf courses and long-term cropping use of agricultural land such as grapes or hazelnut trees. An expressed concern is a solar "farm" might represent yet another one-way land conversion.

A brand new study published by Oregon State University found that plants, primarily grasses flourish in the shade underneath solar panels. The reason was a significant change in moisture. The results bolster the argument for using the solar array land as livestock farming. The idea is to grow food and produce clean energy. The concept is labelled agrovoltaics.

As sometimes happens the discovery was serendipity. Walking past one of the solar arrays on campus one day, biological and ecological engineering professor Chad Higgins saw that green grass was growing in the array's shade. Instruments to measure air temperature, relative humidity, wind speeds, and soil moisture were installed to compare the area under panels and under direct sunlight.

The results found that areas under the solar panels had a different microclimate than exposed areas. Shaded areas were 328% more water efficient, and maintained higher soil moisture throughout the heat of Summer and a 90% increase in late-season plant mass in areas under PV panels. The plants also had more nutritional value to livestock. "Elnaz H. Adeh, J.S. Selker, C.W. Higgins." *Remarkable agrivoltaic influence on soil moisture, micrometeorology and water-use efficiency.* ***https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0203256***

As in other states, honey bees are considered livestock. Bees of course, just like four-legged livestock, such as horses, cows or sheep, depend upon forage to survive. As in other livestock beekeepers can supply their colonies with supplemental foods but total nutritional needs supplied by natural forage is often considered to be more sustainable.

The issue is not the right of bees to forage nor that bee forage can qualify as agricultural zoned land for taxation. We have a ruling upheld in the OR Supreme court in a case brought by John Jacob, OSBA President, in an appeal of a Jackson County denial of agricultural zoning. The County sought to permit the one acre containing the bee hives but sought to change adjoining areas as non-agricultural based on fact that ONLY bees were using it as their forage. In this case John had records of renting the land from homeowners and I served with technical testimony about bees need for forage. In several other states, Texas, Florida and Illinois for example, bee colonies enable landowners to claim Ag land exemptions for tax purposes.

Under Oregon's current land use goal of preserving farmland, the Oregon Department of Agriculture had specified that solar power facilities can be no larger than 12 acres on agricultural land without an exception. The policy was developed largely for the vast rangelands of central and eastern Oregon where it was projected that most of the solar farms would be developed.

In this instance for ag-zoned lands just beyond suburban development, the Clackamas County hearings officer Fred Wilson granted the exemption citing bees and use of the area under the panels for bee forage as consistent with other ag-zoned land such as nurseries, hazelnut and Christmas tree plantations.

The Clackamas project developer, Steve Schmitt of Pacific Northwest Solar LLC, estimated the apiary

would generate $75,000 per year. Opponents claimed the actual revenue would be about 80 percent lower. Fred Wilson, the hearing officer said "Even if income is less than the projected amount, the proposed apiary seems more likely than not to produce significant amounts of income that would still constitute contributing in a substantial way to the area's existing agricultural economy," He called the project "a win-win scenario."

A non-profit farmland conservation group, 1,000 Friends of Oregon, challenged the Clackamas County conditional use permit. The Oregon Farm Bureau too apparently had an issue with the proposal. That was the conflict that captured the national media attention.

The challenge helped develop a broad resolution that "supports a better definition of highly productive farmland" calling for stronger land use protections for farmland while still permitting solar projects and other energy facilities. It was unanimously approved by the State Board of Agriculture.

Two heavily ag-dominated counties that are experiencing suburban housing development/ farm-ets ag land conversion pressures have developed more severe restrictions. Yamhill County, a county on the other side of Portland, prohibits solar farm facilities on top soil classes. Recently a Yamhill 12 acre array proposal was denied based on neighboring vineyard opposition. Marion County, south of the Portland metro area has excluded solar development from "exclusive farm use" zones.

In contrast there is a 40-acre "clean-energy farm" in Eagle Point (outside Medford in Southern Oregon), considered the largest "solar apiary" in Jackson County, that includes Honey bees. John Jacob, of Old Sol apiaries (a queen producing operation) who is President of the Oregon State Beekeepers Association, maintains 48 colonies interspersed among the solar panels. The colonies average100-200 pounds of honey/ colony, compared to county average of 30-40 pounds/colony. **https://www.solarpowerworldonline.com/2018/08/case-study-eagle-point-solar-farm-apiary/**

John sees many benefits from his perspective as a beekeeper. Eagle Point "offers his bees the opportunity for a diverse diet" and additionally to avoid pesticides ". . . these are places where we can take our bees to help their overall health and to recover from their pollination duties."

A different proposal (not including bees or pollinators) for an 80 acre solar project near Medford, approved by Jackson County as an exemption to the 12 acre limitation, was struck down by the Oregon Court of Appeals (on technicalities). The issue went to the Oregon Supreme Court in May. This project did NOT initially include honey bees but on John's initiative they have since been incorporated. Whether this will assist in the appeal is not known, so far.

John says he has bees now on two Jackson County solar sites with a third site in Kalmath Falls, OR, also in southern Oregon, pending approval (expected in December 2018). These solar arrays include bee colonies and bee forage planting. John has consulted on several additional solar sites, including the Clackamas location discussed above, for which he will maintain bees on a 35 year lease basis. He says there are other solar farms under various stages of planning that might include bees and bee forage development.

John is "really excited to help create vast tracts of pollinator habitat that will be managed that way upwards of 30 years."

A project in Vermont has called their combining solar array panels and planting for pollinators a success. **https://www.rutlandherald.com/opinion/perspective/planting-for-pollinators-at-solar-arrays-a-success-story/article_95dbb728-d38e-58cd-9b87-6aa10add1bf7.html** A survey of pollinator population at an early demonstration project in Middlebury, VT resulted in an increase of greater than five-fold in unique pollinator populations in just one year.

The follow up news that you did not hear is that the Clackamas, OR project will go ahead. 1,000 Friends of Oregon agreed to withdraw their opposition per agreement by the developer Pacific Northwest Solar, LLC to study how dual use of beekeeping and planting for pollinators works. Their attorney Meriel Darzen called the "pilot project . . . an interesting concept".

Pacific Northwest Solar agreed to drop their challenge of the current ruling of a 12-acre size limitation. The Oregon Department of Agriculture, is continuing to look at regulations, originally established in 2010 on solar and land use. **http://www.capitalpress.com/Energy/20181005/settlement-allows-beehive-solar-project-to-go-forward**

Thus the bees have a big task to prove their value when incorporated into solar array farms. Will they be able to demonstrate the validity that land beneath solar panels will provide the dual purpose of livestock forage and energy production, both courtesy of the sun? It may take some trial and error to determine the best forage plantings in the shaded and the sunny portions. Yet to be determined is how long will initial establishment of plantings persist before needing reinvigoration or replanting. It remains a strong possibility to provide long-range, highly valuable foraging opportunities for honey bees. BC

SUPPORT YOUR COMMUNITY

SUSTAINABLE BEEKEEPING, PART 3

Meghan **Milbrath**

When I started to keep bees as a business rather than a hobby, I sat down and wrote a business plan and laid out my balance sheets. One thing was immediately obvious as I reviewed my plans – I could never be profitable if I kept buying bees. I had to provide for myself if I wanted my business to be sustiainable. My first step was to cut my demand and reduce my losses – I made my theme for that year "giving *Varroa* the respect that it deserves."

I monitored like crazy, and kept those nasty parasites at bay. The second year, I focused on feeding, and redid my entire system so I could be more efficient, and be ready for when it rains during the entire goldenrod bloom. The final key was to take swarm season seriously, and not lose bees to the trees in the Spring. With season-long *Varroa* control, better Fall feeding, and young queens, my winter losses the last three years have been 10 – 15%, which fits well into my plans. Now, my losses have been to unlucky things like a late queen event, pygmy shrews, and my dumb decision to park a pallet under the downspout from a barn (it was high up, I didn't see it when I moved bees in!).

As I reduced my demand, I also worked to increase my supply. I made a commitment to stop buying bees, but I still needed a source of replacements for the losses that I have. Also, I am not so arrogant to think that I have figured beekeeping out, and won't have a bad year due to a family emergency, natural disaster, new disease, crazy shift in weather, etc. In part two of this series I outlined all the ways that I have done this – I make nucs up in July and August to go through Winter. I also make a lot of splits in the spring for swarm control (which I just finished, which is why part III of the series is a month late!). Each year, I am making increases in May and in July.

Low losses and lots of nucs means one thing – excess bees. Right now I have bees coming out of my ears. For a while, the growth of my apiary looked like a *Varroa* population curve – getting out of control. I didn't sell bees, because I was hoarding them all to myself. But, since I now have a job with a paycheck that I like very much, I don't have the time for unlimited hives, and I had to find an outlet for my bees. By selling nucs in the spring, my operation is much more financially sustainable. I can make money from my hives in the Spring, which covers my operating costs through the season. I also have income for that year, regardless of how the honey flow turns out.

Selling nucs in the Spring

There are a few ways that I have made nucs for sale in the Spring.

1) I just sell an over wintered nuc. This is the easiest logistically – I make up spare five-frame nucs in the late Summer, and if I don't need them in the Spring, I can just turn around and sell them. They have a young queen (from July or August the year before), and

In this nuc clinic held by Kristy Allen of Beez Kneez (pictured), participants first learned how to make nucs, and went home with a queen cell and a wooden nuc box, so they could immediately apply what they learned. (photo by Alicia Donovan)

they really hit the ground running. These are worth the most because they grow the fastest, and they are available first. I can sell these before I split my other hives. However, they are often the hardest for me to sell, because they just look so good, and if I hang on to them, I could get another split from them later – fast nickels versus slow dimes! Demand for these are super high, and I can unload them in about two seconds by just talking to beekeepers or mentioning it at a club.

2) Splits from overwintered nucs. If I hang onto the nuc a little bit, and let it grow to having a few more frames of brood, I can make a split out of it. I can sell the overwintered queen and a few frames of brood, and I can also have enough bees left over to drop another queen cell into and sell another nuc from it in a few weeks. If there are enough bees left, after the second nuc, I can drop a third queen cell in, and let the colony grow up enough to over Winter.
3) Using my overwintered hives to make nucs. There are a lot of ways to do this. I have taken big hives and broken them down into three to four splits, or I have just taken one or two nucs from each hive. If the queen is young, I can sell the overwintered queen, otherwise I can drop in a queen cell or a queen.

Because the demand for nucs is so high, I have never had to market them. I started selling just by word of mouth, or telling my club that I would have nucs for sale. I have posted them on local facebook clubs, and I have taken pre-orders. Generally, I feel comfortable taking as many orders for nucs as I have colonies going into Winter. If I have 70 hives going into Winter, I will take 70 orders. Some hives you won't be able to pull a nuc from, but most others you can take two to three, so it tends to even out.

I have worked hard to make my apiary sustainable and to provide bees to my local area, and many other sideliners in my area are doing the same. However, we still can't meet the demand for bees. Every hobby bee club in my state (and in other states that I visit for talks) organizes truckloads of packages and nucs to support new beekeepers and to make up losses. In order for us to be more sustainable beekeepers as a whole, we need to view the potential of the small beekeepers and the clubs. The final piece of the sustainable beekeeping puzzle for small scale beekeepers is to match the demand for local bees with the untapped supply of bees that are in the hives of club members.

The ideal sustainable beekeeping system	What it really looks like in a lot of places.
•Beekeepers take control back from varroa and overwinter lots of big, healthy colonies. •They make nucs to prepare for losses. •They split their colonies in the Spring. •They make their excess nucs and splits available to the other beekeepers in their clubs and communities.	•Beekeepers lose lots of colonies each year. •If they do overwinter them, they aren't ready to make splits, and lose the swarms. • They purchase their replacements from across the country

How do we get from our super inefficient system to the sustainable dream world of local nucs? I don't totally know. I'd really like to hear from people who have a good system in their area. What if instead of putting energy and effort into club package orders, dedicated volunteers (or a savvy beekeeper as a business) could tap the potential of the hives in the club. I strongly believe that if a beekeeping club decided not to import bees next year, they would still have enough bees. It would take more work, but it could still be a good source of income, and would be much better for the bees, the beekeepers, and the environment.

1) Have a volunteer take 'commitments' from members in the club. If you are going into Winter with four hives, and you don't want to expand your apiary, you should be able to commit to at least two nucs to sell to the club. In the Fall, the club can get an estimate of the supply in the area. Treat this as a social pressure – it is up to the club to provide bees for the club.
2) Set up a list of individuals willing to help with splits. A main obstacle for beginners wasting their bees is intimidation by the split process. This can volunteer, or this can be a hugely profitable endeavor. I did this one year, where I would help beekeepers with swarm control, by helping with splits. I was paid with excess nucs, or the extra splits. Lots of people just donated the excess bees, because they just wanted to keep the colonies they had from swarming. If a club had a list of people willing to help beginners, they could be much more efficient in taking advantage of all the excess bees that are wasted in hives that swarm.
3) Coordinate a source for queens, using your estimates in step 1. Here is a situation where it would be fine to organize a bulk purchase of queens from another location (gasp!). Ideally, there would be a great source of local queens. However, in my area, early queens are a huge bottleneck. I can only start producing queens as soon as the bees are getting ready to split – and even

then there is often terrible weather for mating. I need most of my first round of queens for my own splits, and I know it is the case for others in my area as well. If the club orders bulk queens for splits instead of bulk packages, that is enormously more sustainable, regardless of where they come from in the U.S. Making up splits with mated queens is less intimidating, and makes the bees ready for sale/distribution much earlier.

4) Distribute local queens for Fall requeening and making nucs, and help beekeepers make late summer nucs. Do a demo day, call on your volunteers, and put in an order for nuc boxes. Each beekeeper should be able to pull at least one nuc from each of their hives in late Summer to act as backup. They can get a local queen or queen cell for the nuc, and can sell it in the Spring if they don't need it.

There is a huge role for clubs and educators (and bee businesses) to turn our local bee systems around. It is great that there are so many people interested in bees and beekeeping and that membership is growing. However, the system that we have made to support this growth is absurd. It is absolutely ridiculous that it has become normalized to take high losses, and to replace them from out of state. That is a horrible system, and we need to get away from it. We are too complacent about losses because packages are so cheap and available. We are contributing to a huge carbon footprint by demanding packages for hobby clubs all around the country. We are contributing to the spread of pests and disease across the country when we constantly import bees. First, take the time to evaluate your own operation, for when you will have excess bees, and how you can make them available to other beekeepers. Then consider ways that you can help others do the same. Volunteer to help others make splits. Order 10 queens, and make 10 nucs for sale. Step up in your club to organize a nuc distribution, even if you don't know how to make splits. Not only will the sale of nucs help your business or organization become more financially sustainable, but it will help us small scale beekeepers become more sustainable overall. BC

Extracting Your Honey Crop

David **MacFawn**

Harvesting and extracting your honey crop in the Southeast region can occur as early as April or May. In South Carolina May could be the earliest extraction depending on the seasonal nectar flows. Prior to harvest and extracting, the beekeeper has nursed the bees from Autumn through the Winter into the Spring with a large enough bee population to make a honey crop. Equipment has been assembled and prepared for the Spring nectar flow. Also, *Varroa* mite management performed last Autumn through late Winter and early Spring swarm management helped to achieve large populations of healthy bees.

How do you tell when the honey is ripe and ready to harvest? No matter where you are? The traditional way is when about 7/8 of the frame cells are capped (about 90%). Using this guide, usually it is 18.6% or less moisture to prevent the honey from spoiling by fermentation. An accurate way to tell moisture content is the use of a refractometer to test the honey's moisture content. The acceptable figure 18.6%.

The honey crop may be removed by brushing the frames, fume board, bee blower, and escape board. If you only have a super or two to remove, removing the individual frames from the super with bees attached, brushing the bees off the frame in front of the hive, and placing the frame without bees into a covered empty super with a lid such as an inner cover works well. The original super with bees can remain on the hive with the bees. Additional frames can be replaced into the super on the hive or the original super can be removed if the nectar flow is almost over.

Frame of honey at least 7/8 capped and ready for uncapping and extracting.

Another method is the use of a fume board. A fume board is a cover with an absorbent material on the top's inside surface for the placement of a bee repellent such as Bee Go o Bee Dun. The repellent's label should be followed for quantity and temperature requirements. The bees are smoked very little, just enough to get them starting down into the colony, then the fume board placed on top. If you smoke the full super too much, the honey will taste of smoke (antidotal experience). Often a super with empty frames is placed under the super you are removing, also known as bottom supering, to allow space for the bees being removed. The fume board should not be left on too long, just long enough to push down the majority of bees. You will then remove the full honey super, cover, and place it in your truck.

Ever consider A bee blower? A bee blower is essentially a leaf blower where you place the full honey super on a stand on the ground with frames vertical and blow forced air through the full super with the bees exiting the super's bottom. The full honey super should then be removed, covered, and placed in your truck. The bees removed via this method simply fly back to their hive.

Another way to remove bees from a full honey super is via an escape board. An escape board may be constructed by placing a porter bee escape in the inner cover's oval hole. The bees can go down through the bee escape but cannot return. Place this *below* the super you plan to remove.

Also offered for sale are triangular bee escape boards. The triangular bee escape board works well. The escape board is placed under the full honey super, and you wait a day for the bees to go down and they cannot get back up into the super. It should be noted if there is brood in the honey super, you will not normally be able to get the

A fume board.

A triangular bee escape board, upside down.

nurse bees out of the super. Escape boards work well but require two trips to the beeyard, first trip to place the escape board on the hive, and another trip to remove the full honey super.

The removed honey should be extracted within a day or two, with two days considered maximum, in the southeast to avoid Small Hive Beetle and wax moth issues. A low humidity (50%), temperature controlled, storage room for supers also helps with Small Hive Beetle control. To prevent honey standing too long awaiting extraction, only enough honey should be removed at a time that can be extracted in approximately a day.

Many tools are available to assist in uncapping honey. Essential tools are an uncapping knife, (either cold serrated or heated), an uncapping scratcher to uncap those cells that a knife cannot reach, and a hive tool to separate the supers and remove individual full honey frames.

It should be noted having nine frames in a 10-frame super or seven frames in an eight-frame super will result in the bees pulling out the beeswax cells just past the top bar width allowing an uncapping knife to cleanly remove the cell caps. The cell caps are made of fresh beeswax and appear white in color unless tracked up with travel stains (foot traffic) by the bees. Uncapped frames can then be placed in an extractor or uncapping tank. If a capping scratcher is used smaller beeswax particles will get into the honey that will need to be eventually removed to slow granulation and prevent cloudy honey. These smaller particles maybe removed by straining or allowing the honey to settle and skimming.

There are two common types of extractors. A tangential extractor extracts one side at a time and is placed tangential to the extractor's center. With a tangential extractor you need to be careful how quickly you spin the frame to prevent the frame's wax comb from blowing out. The frames have to be taken out and reversed to extract the other side. Honey bees consume about 8.4 lb. (3.8 kg) of honey to secrete 1 lb. (454 g) of wax,[1] so the comb should be reused whenever possible.

With a radial extractor, the full frames are placed radially in the extractor like spokes on a bicycle wheel. Both sides of the honey frame are extracted at the same time via centrifugal force. The cells slope slightly upwards, between 9° and 14°, towards the open ends. A radial extractor is quicker and easier than a tangential extractor but usually more expensive.

When using an extractor, you can visually see the honey being slung as it collects on the extractor inner walls. When finished, the "wet" empty frames should be placed back on the original hives. This method prevents the spread of disease as well as allows the bees to clean up any residual honey. The wet empty supers should not be placed open in a beeyard when there is a dearth or when the nectar flow is over since the bees will typically tear the comb removing that last bit of honey, and ants, etc. can get into the supers. Wet supers should typically not be stored.

Note the comb drawn past the top bar width with nine frames in a 10-frame super.

As the honey flows out of the extractor it pours through a sieve to remove beeswax and other unwanted particles on its way into a bucket. After the bucket is full, or extraction is complete, seal the bucket and allow the honey to sit several days to weeks. This will allow the air bubbles and light wax and debris to rise to the top surface and heavier debris settle to the bottom. The settled honey can then be poured into a bottling tank for dispensing into jars and other containers or if the bucket has a honey gate it can be bottled directly. (Tip: a piece of plastic wrap placed on top of the bubbles and foam will lift any foam and wax particles from the surface when removed.)

For the small hobbyist a 60-pound/five-gallon plastic bucket with a plastic honey gate is inexpensive and works well for bottling honey. A lid should be used to seal the honey and keep foreign particles and other objects from falling into the honey. A tight-fitting lid is also required to keep water and humidity from entering the honey. A pail perch eases the transfer of honey from a bucket without a honey gate to a bucket with a honey gate to allow all the honey to drain. For the larger operation, a stainless-

Uncapping tank to uncap frames into and to hold uncapped frames prior to transferring to extractor. Note the beeswax cake with slum gum on bottom (turned upside down).

Inside a radial extractor with a brood frame inside for show.

steel bottling tank with a dripless honey gate works very well. Elevating the bottling tank above the jar height with the honey gate directly above the jar eases filling the jar.

Jars and other containers should be washed and sanitized prior to filling. You have the choice between glass and plastic. Glass jars certainly show the honey better but plastic is optimum for easy application for the consumer. Also, glass is heaver to ship and handle than plastic but historically I have found the lids can pop off easier with plastic than glass.

When filling jars, the honey level should be filled just past the top ring of the jar. If filled too full, the honey will leak out the top when it gets warm. You want the correct amount of honey in the jar as defined on the label but not too much that will leak out when warm. The jars should be clean of honey on the outside prior to labeling.

Extracting and bottling your honey is exciting and fulfilling! Seeing that "liquid gold" flowing into your bottles is rewarding. Of upmost importance is cleanliness and sanitation in your extracting and bottling operation. The style, size, and other aspects of the containers you decide to use should be determined by your market and the customer base you will be serving. BC

The Hive And The Honey Bee. *Hamilton/IL; Dadant & Sons; 1992;ISBN.*

A water jacket botler. Note the elevated stand to allow easy bottling.

Bee Tree Bees

So, what could go wrong?

Jim **Rash**

In years past in the Appalachian Mountains of North Carolina, it was not unusual to find a bee tree. The common understanding was that when one discovered a bee tree, one could mark it, although it was on a neighbor's property, the bees and honey now belonged to that person. In those days and environment, honey bees were doing well without beekeeper assistance. However, that was before the advent of *Varroa* mites and the viruses they vector; a colony in the wild now has a much lower chance of making it two years. Therefore, a survivor colony thriving in the wild would be an uncommon occurrence.

In July of 2017, I received a phone call from my brother-in-law, who works with a logging crew. He asked me to come down and rescue a colony of honey bees living in a white pine. I realized this was, most likely, a once in a life-time experience! When I went down that afternoon to size up the situation, the bees were contentedly going about their business, even though their home had just crashed to the ground in a horizontal position. The honey bees paid me no mind; I walked up to the tree and took a photograph of what appeared to be rather healthy and content bees of Italian heritage. The plan was simple enough, I would come back in the morning, cover the main entrance with screen wire, cut out a section of the log, take it to my bee yard, and relocate them into a standard Langstroth hive. A simple and workable plan, I thought, "what could go wrong?"

To paraphrase Robert Burns, "the best laid plans of bees and man oft go astray." The next morning before daylight, I headed to the logging site. All was going according to schedule; I closed the main entrance making sure there was not a single trail in the rough pine bark that would allow the bees a pathway to escape. My first surprise came when I started the truck and the brake pedal went all the way to the floor! What are the odds of both front and rear brake lines rupturing at the same time?

I am a minister, and I had promised a member of our church that I would visit with the family while he was in surgery that morning. I had planned to be at the hospital by 8:30 AM and here I was stranded in the woods. Thankfully the cell phone worked, a few quick calls, first to my wife, to come pick me up, and then to a brother-in-law for help towing the truck to a garage. I arrived at the medical center, one hour late; the surgery was scheduled early that morning, but still had not happened by early afternoon. I reluctantly left the hospital with many apologies to the family, and all the time worried about the honey bees in a tree that had to be moved.

Plan "Bee": borrow a truck, bring the section of the log with the bees to my beeyard, and get it standing upright before the rain arrived. Evening thundershowers with predicted heavy rain would not be good for a nest cavity that originally was vertical and now horizontal. With the help of the logging crew and a track-hoe, a ten-foot section of the log, with ample space above and

The bees coming and going from the bee tree.

The bee tree secured in the beeyard.

The nest showing bees and comb.

The bee tree on display at The Honey Hole in West Jefferson, NC.

below the presumed nest cavity, was loaded on to my borrowed truck.

At my bee yard, I was confident that the tractor with a boom pole would be all I needed to get the log off the truck. Imagine the boom pole as a giant fishing pole and a logging chain as the fishing line; attach the chain around the log and pick it up, that should have been simple enough. However, I discovered that the tractor with a boom pole would not lift the log over the side of the truck bed. (What plan is this by now?) My wife graciously consented to drive the truck out from under the log. As the tractor lift strained with the bee tree suspended by the chain, I was able to raise the log from the truck bed, allowing enough clearance for the truck to move out from under the log.

Cloudy skies, late afternoon, church services at 7:00PM, and hungry bears would be lured to the tempting treats of bees, brood, and honey. Therefore, the bee tree had to be upright before the rain started and protected by the electric fence before dark. For some reason, I failed to take into consideration that this would not be a simple task. In the woods, the assistance of a track hoe was required to load the log, and now I had to finish the job without specialized equipment or even another set of hands.

New plan: I would use a chainsaw and cut off sections of the tree until I could get it down to a manageable size. One block was sawn from the bottom successfully. Now how much did I dare take from the top of the log without getting into the nest cavity? Without the assistance of an infrared camera, I had to guess. The first cut just barely nicked the top of the beeswax comb. I expected hundreds of very unhappy honey bees to come pouring out of the log. However, instead of being mad, the bees lined up looking at me not sure what had just happened. Knowing the job was not nearly finished, I quickly tied a pair of Tyvek coveralls over the top to keep the bees at home!

At this stage, the log was now five feet in length and I needed to stand it vertically and move it into the bee yard before I left for church and the rain started. I brought in a second tractor, attached a modified fork lift to the back of the tractor with a wooden pallet as a lift platform, if I could now get the log standing upright on the pallet, I could use the tractor to move it to the beeyard, and mission accomplished! Sounded easy, but can you imagine a five-foot log swinging in the air suspended by a chain and then defying gravity to let the log down while having it standing upright? I needed to be behind the tractor to manually guide the log into position, and at the same time, I needed to be on the tractor seat to release the lift lowering the log to the ground. With the aid of a stick, I released the lift with one hand, and with the other hand and the weight of my body, guided the log on to the pallet in a vertical position. With a ratchet strap securing the now much smaller bee tree to the fork lift, I moved the bee tree to safety protected by an electric fence. Finally, the bee tree was secure in the bee yard, the top covered with screen wire for ventilation and a solid roof to keep out the rain.

What an adventure that day had been! I had no idea of the trauma all of this had been for the bees. When I was finally able to take off the screen wire covering the main entrance to the nest cavity, I expected honey bees boiling out mad as hornets defending their home. This was one colony of “sweet” honey bees, they were not agitated, just happy to be free as they moved outside bearding – hanging out on the outer surface of the tree enjoying fresh air and freedom.

Phase one of the mission accomplished! The next problem: how do I get bees, fragile beeswax, brood, and honey comb moved into a standard 10-frame Langstroth hive? You may be wondering why not let them stay in the log? That question was answered for me by the General Statutes of the State of North Carolina (§ 106-641): Honey bees are to “be kept in moveable frame hives and be maintained in an inspectable condition or in other hives where an inspection for disease or disorder can be readily made.”

During the next few days, I pondered how to best remove the bees from the tree with the least disturbance

KIM FLOTTUM

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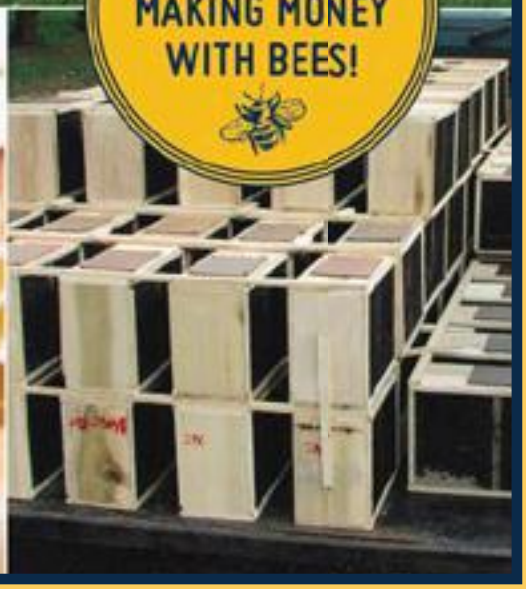


I was confident by the next morning the bees would have found the queen. I should have known better.

and damage to all their hard work building comb, raising brood, and storing honey. A chainsaw would quickly slice away the side of the log; that option, however, would result in significant trauma for the bees and considerable damage to the comb.

When the time finally came to open the nest cavity and manually move bees, brood, and honey comb, I decided to use a wedge and splitting maul to remove the side of bee tree exposing the nest cavity. My 15-year-old bee-buddy and mentee came over to offer a helping hand. With smokers bellowing out a cool white smoke, dressed in our bee suits, tools on the truck, we headed to the beeyard. Using a wedge on each side of the tree, we split off a nice slab with minimal damage to the nest structure. What a wonder, the honey comb was over three feet in length, the brood comb was darkened with time and use, honey of unknown age and floral source with a distinct medicinal flavor, and thousands of honey bees peering out from between the combs and every nook and cranny of the tree.

In order to assist the bees in moving to their new home, a sheet was placed between the bee tree and hive body to serve as a ramp. Hopefully, as we smoked the tree, the bees would make a mass exodus to the hive body. In that march of 60,000 plus bees, we were looking for just one bee, the queen.

The queen proved to be the proverbial needle in the haystack. We worked for two hours cutting sections of comb into chunks that were attached to standard wooden deep frames with rubber bands. The honey frames were placed to the outside of the box and frames with brood comb to the center of the hive body just like in their original home. Carefully watching the mass migration of thousands of bees and cautiously inspecting each section of comb, we still had not found the queen. No matter how enticing the new home, without finding the queen and moving her to the new hive, many of the bees would return to their queen, while the younger nurse bees would stay with the brood.

Repaired comb in October of 2017.

By early afternoon, we had the beeswax comb with honey and brood all moved to the new hive. After a short break for lunch, we went back to work with more smoke. And by the grace of God and as an answer to prayer, when I glanced at the bees marching from the log, there she was – a beautiful golden queen! Just in case, I had put my queen catcher in my pocket; this essential tool looks like a giant version of a spring-loaded plastic hair clip and it allowed me to safely pick-up and contain the queen.

Now that the queen was secure, she was placed in the new hive; my hope was that the bees would eventually go to the queen. The tree cavity was empty of comb, but that was not true for the bees, maybe if I gave them 24 hours, they would all migrate from the vacant tree and join their queen. Before we left the beeyard that afternoon, the tree was covered with the sheet to give the remaining bees some protection from the elements.

The next morning, I hoped to find all of the bees content in their new home in the presence of the queen. But much to my dismay, there appeared to be as many bees in the tree as in the hive. The queen's pheromones and the pheromones of the colony were still strong enough in the tree to entice worker bees back to their original home. Now what could I do?

Smoking only seemed to work temporarily; new plan, find someone who had a bee vac. (A bee vac is a modified Shop Vacuum that suctions the bees into a hive body with frames and wax foundation.) As always when I required help or information, I went to the Honey Hole. (The Honey Hole is the beekeeping supply shop, in West Jefferson, NC, that focuses on bee education and support at the local level.) There I found the information I needed; not only was I introduced to a beekeeper with a bee vac, I was to meet him at the bee yard in an hour.

A bee vac surely would finish the job and remove all the bees from the tree. When my new beekeeper friend arrived, we ran a drop cord from the chicken house and he went to work. He vacuumed for a couple of hours successfully capturing hundreds of bees. However, the task was more difficult than I imagined; years of decay

The bee tree in July 2018.

I now have nine new colonies with Bee Tree Queens.

had left hundreds of crevices and ridges – all perfect places for bees to hide. When we finished for the day, I placed the box with the newly captured bees on top of the hive with the queen and the bees removed the day before and again covered the tree with the sheet to help protect the remaining refugees from the cool August night.

I was confident that by the next morning all the bees would have found the queen and moved into their new home. I should have realized my plans are not always what the bees think will be best for them. That morning, my goal was to remove the empty bee tree from my apiary and move the tree to the Honey Hole to be put on display. However, upon removing the sheet, there were still bees in the tree, lots of bees. I lit my smoker and with the bee brush went to work gently persuading reluctant bees to march from the only home they knew to a new home. After some time, all the bees I could find were moved to the hive with the queen and other bees.

Finally, the bee tree honey bees were settled into a new home and the bee tree on display at the Honey Hole in West Jefferson, NC. During the Autumn of 2017, the bees quickly repaired and filled frames with new wax securely attaching the chunks of comb that I had held in place with rubber bands. Honey bees are meticulous housekeepers; they chewed through the rubber bands and hauled them out the front door.

The queen showed remarkable build-up in late winter and spring of 2018, so the colony had a large and robust population ready for the early nectar flow. Based on the evidence I saw in the bee tree; this colony had been there for some time. It was possible this colony was a swarm that moved into a vacant nest cavity with old comb. However, if the existing nest had been devastated by wax moths and honey robbed by yellow jackets, there should have been more evidence of white wax showing that new comb had been constructed.

The only evidence of new wax was near the top and sides of the tree where the bees were building comb to expand their nest and storage capacity. If indeed, these were "survivor" bees, this is a genetic line that I very much want to preserve and incorporate into the beeyard.

I now have nine new colonies with bee tree queens. From one and one-half years of observation, the bee tree bees have many desirable traits and characteristics: gentle disposition, robust colony with explosive early Spring buildup, low tendency to swarm, and great productivity. These bees produce a significant amount of propolis which in turn makes my work more difficult; however, rather than calling this a negative, when I consider the anti-bacterial and anti-microbial benefits of the propolis for the bees, this is a positive trait as well. Resistance to disease and *Varroa* mites looks promising, but time will tell.

A healthy and productive survivor colony with a "sweet" disposition and well acclimated to the mountains, the bee tree bees are the "super-stars" of the beeyard! BC

Richard Colvin and the Search for the Italian Honey Bee, Part 2

Matt **Redman**

The drive to be the first and the best was very strong in American beekeeping, especially between the years of 1850 to 1870. Richard Colvin was in the forefront of the effort to bring the Italian strain of honey bees into the United States. The first attempt had been made in 1855 by Edward Jessop, son of Jonathan Jessop who developed the lop-sided York Imperial apple, and Langstroth's friend, bank teller Samuel Wagner. The bees were procured but did not survive their long voyage. The best account we have of the next attempt to import Italian bees was offered by Colvin in his article, "The Italian Honey-bee; or the Culture and Italianization of the Native or Black Honey-bee" which was included in the Report of the Commissioner of Agriculture for the Year 1863:

"In the Winter of 1858 – '59 another attempt was made by Mr. Wagner, Rev. L.L. Langstroth, and myself. The order was placed in the hands of the surgeon of the steamer, (to whose charge the bees were to have been committed on the return voyage,) with instructions to transmit it to Mr. Dzierzon on reaching Liverpool; but, in consequence of his determining to leave the ship to engage in other service on his arrival at Bremen, it was not done, and this effort failed. Subsequent arrangements were made by which, in the latter part of that year, we received seven living queens. At the same time, and on board the same steamer, Mr. P.J. Mahan, of Philadelphia, brought one or more queens, which were supposed to be of doubtful purity. Only two or three young queens were reared by us during that Fall and Winter, and in the following Wpring we found all our imported stock had perished."

Colvin was single-minded in his goal and was not above disparaging beekeeping competitors, like P.J. Mahan, whom he thought were careless. As he stated in the article noted above, his desire was simple, if obtained with difficulty ". . . I determined, before disposing of any queens, to Italianize my entire apiary from the purest stock to be procured, and accordingly made subsequent importations from the most reliable sources, including the vicinity of Lake Como." As it turned out, his imported stock, almost exclusively, were from shipments that originated from the cultivated hives of the famed German-educated Polish priest Johann Dzierzon.

When it came to matters of honey bee racial purity, Colvin had a fixed purpose. In a personal letter by him that was written to a private individual but shared with the readership of the Ohio Farmer in March of 1863, we get a glimpse of Colvin's highly disciplined, as well as factious, program:

". . .You are probably aware that some two or more persons besides myself and Mr. Wagner, imported the Italian Bee. Either they did not get pure stock, or else they have mixed it in breeding, and the consequence is they display the characteristics of the hybrids and mixed breeds, such as ill temper (much worse than our common kind), variety, or "sporting" in color, &c. It is an easy matter to breed Queens, but not so easy to breed them pure. I threw away over 100 Queens, which to all external appearance were pure, and which I might have sold at $10, had I been disposed to play the rogue."

If Richard Colvin seemed a bit overly defensive of his business and methods perhaps it was because he knew very well what it feels like to be accused of playing the rogue. He was not always Richard Colvin; he was born Richard Colvin Warford in Hunterdon Co., NJ, in 1819 to David Warford (1788 - 1877) and Rhoda Mettler (1793 - 1836). His siblings were: 1) Reading Warford (1813 - 1858); Hamilton Warford (1815 - 1873); Rachel

Image Courtesy of Dave Crouse, Find-A-Grave

Jane (Warford) Reaney (1822 -1892); and Cornelia Ann (Warford) Taylor (1824 - 1886).

Sometime around 1847, Richard C. Warford, and his sister Rachel, went to live in Baltimore City, with an aged, wealthy relative named Rachel Colvin. Miss Colvin had accumulated a sizable fortune as affluent unmarried members of the Colvin family predeceased her. A relative named Mary Ann Warford, the daughter of Elisha Warford, had already been living with Rachel Colvin for most of her life. In 1845, after Miss Colvin had become ill for a time, a will favoring Mary Ann was written. Three years later, after Richard Colvin Warford moved into the house, a surviving fourth will was drawn up – signed by Miss Colvin before she was adjudged to be a "lunatic". On 17 July 1850, Richard and Sarah J. Henry were married in Baltimore. Rachel Colvin passed away in 1853.

The "Colvin Will Case", as it came to be known, fascinated readers of the Baltimore Sun newspaper which closely followed the details of the suit in the County Circuit Court of Baltimore. The length of the trial – 35 days with the jury in session – exceeded all previous records. If Richard C. Warford prevailed, the bulk of the estate was to go to him. Elisha Warford's legal team included the famous, high-priced Reverdy Johnson; their strategy was to have the estate divided among the heirs-at-law. The following account is from two letters written by preeminent Baltimore lawyer Arthur W. Machen to his father:

Baltimore, January 30, 1855

There is a case now going on in one of the courts now in session here which has considerable general as well as professional interest. It arises out of the wills of a wealthy old lady late of this city, Miss Rachel Colvin. The testatrix had been a very strongminded woman, having both the capacity and the disposition to manage all her affairs, but during the latter years of her life her mind became impaired and was occasionally in a state not easily distinguished from insanity. She made a great many testamentary instruments, and altered them almost as soon as made. The last will she executed gives the bulk of her estate to a young man, a relative, who had the opportunity of exercising an undue influence over her and whose conduct, as far as it has become disclosed, is not free from suspicion. Supposing this will, which was made in 1848, to be broken, it is then by no means clear what disposition is to be made of her property; for another will now in existence, executed in 1845, is also impeached on several grounds, and two intermediate wills, one of 1846 and the other of 1847, seem to have been destroyed. Mr. Reverdy Johnson and his brother, late Chancellor of the State, are in the case, on opposite sides.

Baltimore, February 17, 1855

The great Colvin Will Case, besides the interest growing out of the questions of fact which it suggests, gives rise to the discussion of some nice points of law. Mr. Reverdy Johnson sustained his reputation the other day by an argument upon them of which I heard only a small part. His brother, the late Chancellor of the State, replied to him with much ability. The decision of the Court – Judge Constable – conceded to be the ablest of all the judges of the State – was with Mr. Reverdy Johnson; yet the law, I apprehend, is with the other side. On Monday, the argument to the jury will be commenced. Mr. Henry Winter Davis is in the case on the same side as Chancellor Johnson and will make the closing argument. Such a cause contains every element to stimulate counsel – large contingent fees – public attention – difficulty – intrinsic interest of the questions involved."

In the end, the Court of Appeals sustained the jury which upheld the provisions of the will of 1848 wherein five-sixths of Rachel Colvin's estate went to Richard Colvin Warford – contingent upon his legally changing his name to Richard Colvin. The estate was valued between $250,000 to $300,000. Thus, Richard Colvin, formerly Warford, who soon became heavily invested in apiculture, partnering with Lorenzo Langstroth and Samuel Wagner, could nonetheless refer to beekeeping as his "hobby". When Richard Colvin died the Baltimore Sun ran a brief obituary noting merely the date of his death, 10 December 1872, and his age, 54 years. Family friends were "…respectfully invited to attend the funeral on to-morrow (Friday) afternoon, 11th instant, at three o'clock, from his late residence, No. 77 East Baltimore street, without further notice." He was interred at Green Mount Cemetery, Baltimore City. Though once again his contributions to bee culture were left unmentioned, his death notice in the Delaware (Ohio) Gazette was a bit livelier:

"Richard Colvin died at the home of his son in Baltimore, MD. The deceased had a large circle of friends

in our city. He was a son of David Warford, of Concord Twp., and a brother of Hamilton Warford and Mrs. John Taylor. He was possessed of large wealth inherited from a maiden aunt, a Miss Colvin, who died some years ago in Baltimore willing her estate to him on condition of his adopting her name, which change was affected by Legislative enactment. The validity of the will was contested by other relatives, but Mr. C. finally triumphed."

After Colvin's passing, his business in Baltimore, known as "Sunny Side Apiary", came into the possession of Charles Herbert Lake (1839 - 1916). Lake went out of his way to keep the memory of Colvin's contributions alive. Encouraged by friends to write to The Bee Keepers' Instructor (Somerset, KY) in December 1881, C. H. Lake sought to confirm that Colvin "was first to introduce the Italian bee to this country" and proffered the following evidence: "I have in my possession several caskets in which these bees were imported, and from translating the directions found on them I find one was shipped in May, 1859, the same being in Dr. Dzierzon's hand writing, and was doubtless the 'casket' that contained the 'seven living queens.'"

According to C.J. Robinson in the October 1881 volume of the *ABJ*, in a small piece called "The Movable-Frame Hive", Lake was also said to be in possession of "the first movable-comb frame hive seen in America." The writer contended that this hive "...with a colony of bees in it, was presented by King Otto, of Greece, to the lamented Richard Colvin, late of Baltimore." Robinson's bold conclusion was certainly in error: "It was from an inspection of this hive that Rev. Mr. Langstroth got the idea of his movable-frame hive; at least I so understood it at that time, and Mr. Colvin so reported it." That Colvin would contend such a thing is doubtful indeed and the hive in question, whatever its origin, was nowhere to be found in America when Langstroth made the discoveries that led to his hive patent in 1852.

One fitting final note concerning Richard Colvin is worthy of mention in conclusion. When the apicultural building on the College Park campus of the University of Maryland was completed in 1951 it was the first building on a college campus to be devoted entirely to bee culture. Dr. Dewey Caron in an article called "The Art of Beekeeping in Maryland–Past and Present", in Vol. 1, No. 3 of The Associates of the National Agriculture Library (Beltsville, Maryland) publication, Heritage of Agriculture in Maryland 1776 - 1976, added the following fact: "At the dedication ceremonies, Dr. E. F. Phillips of Cornell, the first head of the USDA Bee Laboratory at Somerset, Maryland, presented the University with an early original Langstroth hive made by Richard Colvin of Baltimore." An email reply from Dr. Caron confirms that this hive is "...on permanent loan to the Ohio State University Bee museum at Wooster Ohio." BC

All The Buzzz in...

Hello Friends,

Enjoy the last days of summer!

Bee B. Queen Challenge

Bee B.Queen

Send or e-mail your artwork to share.

Pollination Puppet Play

Make your own mini puppet show using a cup for a stage.

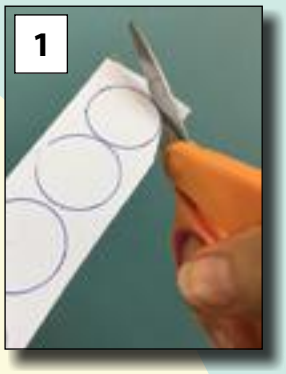
You will need:
• white paper or cardstock • paper cup • straws • pen • scissors • markers • tape

Putting on the Show:

1. Drop all the puppets to the bottom of the cup.
2. Push different straws up to reveal each character in the play.
3. Write a little puppet play or just make up a story or song on the spot.

Making the Puppets:

1. Cut white paper or cardstock into circles using a quarter as a pattern. You will need 3 – 5 circles.



2. Color each circle with a different "character" for your play. You may want a sun, rain, flower, bee, farmer, food…

3. Tape each circle onto a straw.

4. You can have more characters by taping two circles back to back on the straw. Tape the edges to connect both sides together.

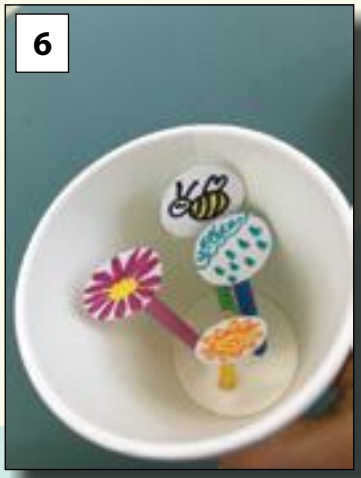
Bee kid's corner

Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
August 2019

Making the Stage:

5. Punch holes in the bottom of a paper cup using a pen. You will need 3 – 4 holes.

6. Push the straws with the objects on the ends into the hole at the bottom of the cup.



The Little Seed

Take a little seed and plant it in the ground. (seed)
Now the rain is falling, falling all around. (rain)
Now the sun is shining on the earth below. (sun)
Rain and soil and sunshine will help the flowers to grow. (flower)
Honey bee pollinates while gathering food. (bee)
To take back to the hive and feed their brood.

You will need a seed, rain, sun, flower, and bee. Put the seed on one side and the flower on the other. Spin it around when you get to the flower part. Do the same thing with the sun and the rain.

Here are some stories and poems to help you get started!

Story - From Seed to Food

You will need: rain, sun, a yellow flower, and a watermelon.

Narrator: Once there was a farmer. First she turned the earth. Then she added rich, dark compost to the soil to help nourish the seeds. Finally it was time to plant the seeds.
Farmer (You): I love planting these seeds. Hard to believe something so small can grow into a watermelon. It looks like rain is heading this way.
Rain: You know, all living things need me – water. I'll gently rain on these seeds to help them grow.
Sun: Don't forget about me! I help plants get the food they need by providing energy for photosynthesis.
Narrator: Finally the seed grows into a vine with yellow flowers.
Watermelon flower (yellow): Bees, bees, hello bees. I need you! Can you move my pollen around to another watermelon flower so I can make a watermelon with seeds inside so I will be able to grow another watermelon vine?
Bee: Sure thing because guess what? I need to visit you! You flower, have food for me to take back to the hive. We love nectar to make honey and we love pollen. Mmmmm good!
Narrator: The pollen goes down, down, down into the flower. After some time the flower develops into a watermelon.
Watermelon: I am here thanks to the farmer, the soil, the seed, the rain, the sun, and the honey bee. Lucky me!

The Farmer Plants the Seeds

(Tune: Farmer in the Dell)

The farmer plants the seed,
The farmer plants the seed,
Hi Ho the Derry-o
The farmer plants the seed.

The sun begins to shine...
The rain begins to fall…
The seed begins to grow…
The flower opens up…
The bee pollinates…
The plant makes some food (and seeds)…

Beecome a Bee Buddy

Send two self addressed stamped envelopes and the following information to: Bee Buddies, PO Box 1693, Bastrop, TX 78602.

Name
Address
Age
Birthday Month
E-mail (optional)

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

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

Meet The Varroa Mite…

The Varroa Mite, *Varroa destructor*, is an external parasite that attacks adult and immature stages (brood) of honey bees. These mites weaken bees and can transmit viruses during the feeding process.

Common signs of mite damage include:
1) open or damaged pupal cells;
2) holes in pupal cappings;
3) emerging adult bees with deformed or missing wings; and
4) visible mites on bees/brood.

Unmonitored and untreated infestations of Varroa mites can result in colony death. Colonies should be routinely monitored so informed management decisions can be made about population levels, treatment methods and efficacy. To obtain the best results, incorporate a range of the chemical and cultural Integrated Pest Management (IPM) methods listed in this brochure.

10 Steps To Doing An Alcohol Mite Wash

MATERIALS NEEDED:

- dishpan
- ½ cup measuring device
- ½ cup 70% rubbing alcohol
- mite wash jar

DIRECTIONS:

1. Inspect honey bee colony to remove a single frame that contains open brood and adult bees. Make sure the queen is not on the frame.
2. Shake worker bees from this frame into the dishpan.
3. Quickly scoop ½ cup of worker bees (~ 300 bees) from the dishpan and put into provided mite wash jar filled half-way with 70% alcohol.
4. Shake leftover live bees from the dishpan back into the hive.
5. Put the solid and mesh lids on jar and tightly seal.
6. Shake jar vigorously for 1-2 minutes to dislodge mites from submerged bees. Let jar sit for a few minutes to let mites dislodge.
7. Remove solid lid from jar, leaving mesh lid and tightly seal.
8. Pour the mixture of dead bees, mites and alcohol through the mesh lid over the empty dishpan to remove the mites and alcohol. Vigorously shake jar contents while pouring to ensure mites are dislodged.
9. Sift through the liquid debris to count the total mites. If the total number of mites ranges from 3-9, consider treatment options.
10. Discard bees. Alcohol can be re-used if mites are removed. Wash all re-usable materials after use.

MDAR
Massachusetts Department of Agricultural Resources
Division of Crop and Pest Services

maine Department of Agriculture Conservation & Forestry

Varroa Mite IPM

Integrated Pest Management (IPM) Options for Varroa Mites

NAME	ACTIVE INGREDIENT [CHEMICAL CLASS]	MODE OF ACTION	APPLICATION MATERIAL	APPLICATION SEASON & TEMPERATURE GUIDELINES	TREATMENT DURATION	KEEP HONEY SUPER ON?	NOTES
Apivar®	amitraz [amidine]	contact	plastic strip	Spring, Fall	42-56 days	no	honey supers put on 14 days after strip removal
Apistan®	tau-fluvalinate [pyrethroid]	contact	plastic strip	Spring, Fall [>50°F]	42-56 days	no	mite resistance shown; honey supers put on after strip removal
CheckMite+®	coumaphos [organophosphate]	contact	plastic strip	Spring, Summer, Fall	42-45 days	no	mite resistance shown; do not use for queen-producing colonies
Apiguard®	thymol	fumigant	gel or gel tray	Spring, Fall [60°F to 105°F]	28-42 days	no	Restricted Entry Interval (REI) of 48hrs; honey supers put on after gel removal
Api Life Var®	thymol, menthol, eucalyptus oil	fumigant	tablet	Spring, Summer, Fall [64°F to 95°F]	26-32 days	no	honey supers put on 30 days after tablet removal
Mite-Away Quick Strips® (MAQS)	formic acid	fumigant	gel strip	Spring, Summer, Fall [50°F to 85°F]	7 days or 21 days	yes	penetrates wax cappings; check queen vitality after treatment
Formic Pro®	formic acid	fumigant	gel strip	Spring, Summer, Fall [50°F to 85°F]	14 days or 20 days	yes	penetrates wax cappings; check queen vitality after treatment
Oxalic Acid	oxalic acid dihydrate	contact, fumigant	vapor or liquid	Spring, Fall	varies by application type	no	most effective when brood-less
HopGuard®II	potassium salt of hops beta acids	contact	cardboard strip	Spring, Summer, Fall	30 days	yes	most effective when brood-less
Screen Bottom Board	cultural, non-chemical options for management	varies depending on management type		Spring, Summer, Fall, Winter	all year	yes	check mite drop for effectiveness
Drone Brood Trapping/Removal				Spring, Summer, Fall	14-20 days	yes	remove comb/open drone cells before emergence
Brood Interruption				Spring, Summer	14-20 days	yes	split hive or allow to swarm; but capture swarm
Re-Queen/Cage Queen				Spring, Summer	28 days	yes	select mite resistant stock when available

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Northeastern IPM Center

USDA United States Department of Agriculture National Institute of Food and Agriculture

WINTER'S COMING

Time to insure hives have enough honey!

In the northeastern United States, August is the time to start preparing honey bee colonies for Winter. There are two primary tasks that the beekeeper needs to accomplish at this time of year. The first is to be sure that mite levels are under control. The second, and the focus of this article, is ensuring that they will have enough honey to see them through the Winter months. The process of providing enough food for a colony's Winter needs starts several weeks prior to the honey harvest.

During the end of July or early August will be the last time I place empty honey supers on colonies in Vermont to provide room for nectar storage. I hope to give the bees plenty of time to fill all the space they have prior to my harvesting the excess honey they will not need for Winter. The first weeks of September are the only time of year that a clear evaluation of Winter stores can be made providing an honest determination of any excess that may be available for harvesting.

Regular readers will know that when harvesting honey, I like to leave the equivalent of a full deep super of honey (two shallow supers) on top of the brood nest in the hive. This mimics the way that the bees naturally organize their hive, with honey located mostly off to the sides and above the brood. By leaving most of the honey stored in the hive above the brood, the bees can easily move up into the honey supers once they have consumed all the honey that is below in their Autumn brood area.

The benefits of leaving plenty of honey above the brood nest for Winter are several. First I don't have to worry much about the bees running out of honey before next Spring. This saves me time by eliminating extra hive checks and greatly reducing the need to feed during Autumn, Winter or early Spring. It also helps to ensure that the bees will have access to all the carbohydrates they need, when they need it, so that their Spring condition will be strong and they will be fully primed for the new season ahead.

A late August – early September harvest also allows me to evaluate each colony's honey storage and provides plenty of warm weather to allow time to feed colonies that have not gathered enough honey to see them through the dearth of Winter. Although sometimes there is a late season honey flow of goldenrod and aster honey, but you can't count on it, and if you do and it does not materialize, it may become too cold to feed adequately for the Winter. Once temperatures have dropped to the point where the bees have to cluster in order to retain warmth, it becomes difficult for them to reach feeders that are not positioned directly next to the cluster. I would much rather feed early and leave any goldenrod and aster honey for the bees to pack into their hives as extra insurance and be sure colonies are good and heavy once the Winter season settles in.

My first chance to feed bees that did not gather enough for themselves during the season is when I am taking honey supers off the hives. Removing a super full of capped honey and placing it on top of a colony that needs a super full to get through the Winter is the fastest and easiest way to ensure that the bees have access to the highest quality food for the Winter months. When we provide a colony with capped honey in the comb, we are also conserving the colonies energy and saving the workers of the hive the work of processing, dehydrating and capping thousands of cells of honey.

Colonies should also be fed when they contain combs that are not full of brood, pollen or honey. This also means feeding is called for when hives contain undrawn foundation, especially when these unused frames of comb are above the brood chamber. Such unused areas when left in an overwintering hive can cause the bees to eat themselves into a corner and starve once they find themselves surrounded by nothing but empty comb or foundation with the rest of

In the Northeast, unused frames of comb or frames of partially drawn out foundation in August call for feeding in order to adequately prepare a colony for Winter.

Moving honey supers from colonies that produced excess to colonies that do not have enough food for Winter is a much quicker and easier way to feed hives for Winter than dealing with feeders and syrup or fondant.

the honey in the hive too far from the warmth of the cluster to reach.

Colonies that need a few frames of honey rather than full supers will need additional feeding of syrup. It is standard practice to always use syrup made up of two parts sugar to one part water late in the season in order to get the maximum amount of carbohydrates into the hive as fast as possible. Unless you have a colony that has recently gone queenless and can be ransacked for frames of capped honey to give to colonies in need, removing individual frames of honey from one hive to feed another simply shifts the problem of empty space in the hive from one colony to another rather than solving it.

When feeding a colony in an effort to get them to fill empty comb or draw foundation out into comb, I find it helpful to rotate the empty frames or foundation from the outside edges of the super into the interior. Bees seem to dislike a lot of unused empty space in the midst of their nest and will tend to fill such frames faster than if they are off on the far edges of their hive. Empty unused frames along the outside edges of the hive are common when additional honey supers are added to the colony too soon. Bees will often ignore the frames on the outer edges of their nest and move up into the fresh supers creating a "chimney effect" where the center frames are all in use but the outer frames are not.

Since I tend not to use queen excluders, colonies with a prolific queen will sometimes expand their brood nest up into the honey supers as well. In order to reconfigure the colony so that the brood is primarily below and the majority of the honey is above it, I will exchange the frames of brood from the upper supers with frames of honey from the lower hive bodies.

Should a colony have so much brood up by the inner cover that there are not enough frames of honey below in the brood nest to exchange them with, late August or early September is not too late in the northeast to place an entire super of brood down on the bottom board. I use screened bottom boards open all year around, so after reversing the bees in spring, the bees will tend to move up in the hive during late Spring and Summer so there is more of a buffer between their brood area and the screened area. By Autumn, the bottom super may even be mostly empty. Since this empty space is not in the upper portion of the hive that the bees will occupy during Winter, there is usually no problem with storing a mostly empty super on the bottom of the hive during Winter, especially if storage space in the honey house is at a premium. If there are too many hive bodies of brood on the hive however, I can remove the bottom super and replace it with one of the brood filled hive bodies in order to keep the hive configuration with the brood mostly down below and honey above. The empty hive body on the bottom board can also be removed if the hive is made up of too many boxes and I want to contract the size of the colony's cavity so it is easier for the bees to patrol, and maintain throughout the Winter months.

This process is similar to the reversal process used in Spring to slow down the swarming impulse, only an empty super is not placed on top of the hive to provide more space for the colony to expand into. At this time of year we work to accomplish the opposite, and rather than provide additional space we should remove extra space in the hive, especially when it is located above the brood nest. It is hard to exaggerate the importance of getting rid of all the empty unused space within the hive to ensure that as the cluster migrates upward during the Winter, they are always in contact with stored honey and pollen and won't starve.

Making sure colonies have enough food to see them through until Spring is one of the easiest Winter preparations we beekeepers can do help guarantee strong colonies next year. But providing bees with adequate food reserves for winter requires a lot more than just feeding or even the amount of honey that is in the hive. We have to harvest our honey crop at the right time, we have to make sure the honey in the hive is organized appropriately, and we have to give ourselves adequate time to provide enough feeding when necessary. In order to accomplish these tasks, we have to start thinking about a colony's Winter reserves early and begin work to provide adequate food to hives in August in order to ensure that colonies will have enough food to see them through the coming Winter months. BC

Ross Conrad is co-author of the newly released The Land of Milk and Honey: A History of Beekeeping in Vermont.

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Bees As Seeds

Part II Of A Queen For All Seasons

There are 28 recognized subspecies of *Apis mellifera.*[1] They are all honey bees, yet they are distinct ecotypes. Ecotype signifies a population of a species (in this case, honey bees) which through environmental selection and isolation, are able to survive as a distinct group and which are comparable with a taxonomic subspecies.[2] And a subspecies is a biological classification which designates a category of a population from a particular geographic region which is genetically distinguishable from other such populations of the same species that is capable of successfully interbreeding with them where its range overlaps theirs.[3] In other words, subspecies are akin to races, or strains of a species. They can mate with each other to produce viable offspring that are of mixed genetics.

When bee subspecies mate with each other, their crosses can display a variety of behavior and traits based on the mixture of genetics. There is a process of hybridization and the result can lead to a cross-stock that outperforms both parents which is given the term *heterosis* or *hybrid vigor*.[4] The consequences of genetic bottle-necking in U.S. honey bee stock lines has been brought to the attention of the industry by various researchers. There are fewer than 50 commercial *queen producers* nation-wide. And even fewer actual *queen breeders*.

What is Queen Breeding?

You may wonder, "Well, isn't queen production the same as queen breeding?" The short answer is no, they are not the same. Yet, one does lead to the other and is affected by the other.

To clarify – *Queen Production* is the means and processes of rearing queens. It can be accomplished in several ways, such as through walk-away splitting or grafting of larvae. Production of queens can be done on a small to large scale

Queen Breeding on the other hand, is the art of selection. Selective breeding requires tedious attention to detail and the interest and know-how of following a regiment of selection. This regiment can include hygienic testing, topographical management and testing, and intentional genetic integration from particular stock lines.

Sue Cobey, a leading world bee geneticist, once told me that breeding bees cannot be accomplished in a few seasons, but rather, takes a career. And I agree with that statement wholeheartedly. Selection of breeding stock is an ongoing process. Especially if one is wanting to breed bees with particular traits which can be affected by the environment or which fluctuate over time.

An example of this is selecting for *Varroa*-resistance. When conducting mite counts on hives, one can notice that the levels of *Varroa* infestation can and will fluctuate. Is a one-time count sufficient for selection? Or should one take *Varroa* counts on a regular basis and then take the average and breed queens off of the ones with the lowest averages?

Another example is with hygienic testing. Does hygienic testing equate with removal of varroa infested brood? Or does it simply show that some bees can detect dead larvae that was frozen by liquid nitrogen and remove them? Is hygienic testing conclusive on the behavior and performance of a given hive? Is it enough to select breeding stock?

In these changing times, and shifting climates, with increasing *Varroa*-vectored pathogens and the challenges of limited habitat, queen breeding AND queen production are both challenged.

So, how does the selection of breeders feed into the production of queens? It starts with a seed!

The genetic stories that have unfolded over millennia are magnificent! Every living organism has been sculpted

[1]Sheppard, W.S. Bee Culture, Feb 2012, Vol.140(2), pp.24-27
[2]**https://www.merriam-webster.com/dictionary/ecotype**
[3]**https://www.merriam-webster.com/dictionary/subspecies**
[4]Cale, G., & Gowen, J. (1956). *Heterosis in the Honey Bee* (Apis Mellifera L.). Genetics, 41(2), 292-303.

Breeding bees cannot be accomplished in a few seasons, but rather takes a career.

by environmental surroundings and the passage of time. We tend to think that it is a nature vs. nurture situation but, it is actually that nature nurtures and tortures. The nurture aspects are composed of those conditions that encourage the cycles of life. The torture aspects are the stressors that encourage an organism to adapt and evolve. Nurture and torture are two sides of the same coin, so to speak.

In general for honey bees, their genetic stories have been shaped by the variety of environments from which they originate. The various ecotypes that have evolved are distinct from each other yet are able to interbreed. These ecotypes are what we refer to as coming from Europe, Africa and Asia. Once they were imported into the U.S. on varying timelines, they began to hybridize and also adapt to their new environments.

The rise of industrialized agriculture and super-size farms for food production also had an effect on queen breeding and production here in the U.S. Queen breeding became a niche endeavor whereas queen production began to follow the steps of large-scale commercial applications. About 80% of all bees in the U.S. are produced in northern California and distributed across the nation. These bees do vary in their genetic stories and learning about queen producers' practices and their stock origins is fascinating. I plan to follow up on this article with interviews from a variety of producers- from coast to coast and from border to border to share their distinct philosophies and dedication to the craft.

Many of these queen producers are high volume enterprises. They recognize the needs of beekeepers and are dedicated to supplying as many queens to their customers as possible. Their stock lines vary yet there are pockets of where they intersect each other by their proximity of mating yards. Drones and queens will fly a distance to mate. Drones will fly to DCAs (drone congregation areas).[5] These DCAs are located in the air and with newer technology, we are beginning to learn more about what sites are selected for DCAs and what they have in common.[6]

Large-scale queen producers tend to have enough on their plate with their keen attention to seasonal needs of commercial beekeepers and pollinators. Since queen breeding requires additional time, energy, and details, many of the queen producers rely on breeders who specialize in particular stock lines to supplement and integrate into their production programs. An example of this is the queen breeding program run by Washington State University and the Sheppard Apis Molecular Lab.

Dr. Steve Sheppard, in collaboration with Sue Cobey and Dr. Brandon Hopkins (who are both also with WSU), began a quest in 2008 to visit "Old World" (European and Asian) countries to find distinct stock lines that could help to re-invigorate U.S. based American bee production. Their efforts have helped to bring in varroa-adapted stock lines from Slovenia, Georgia, Kyrgyzstan and some additional Italian-based stock. These stock lines include genetics from the Caucus mountains (*Apis mellifera caucasica*) also referred to as Caucasian bees. Also included in their importations is stock from an apple-growing region near the Chinese border in Kyrgyzstan of a bee which Dr. Sheppard named, *Apis mellifera pomonella*.[7]

Due to a law from the 1920s, they are not able to import bees as the whole organism. This law went into effect at a time when the tracheal mite was devasting England. At the time, this was called the "Isle of Wight" disease and it prompted the closing of importations of honey bees to the United States.[8] Because of this, Dr. Sheppard and his team have only been allowed to import semen collected from drones. This requires a timely visit where they visit various beekeepers and collect as much semen from select colonies and rush back to the states to then inseminate virgin queens.

Dr. Hopkins- building off of initial work by Dr. Megan Taylor (both former students of Dr. Sheppard's) has been instrumental in developing a process of cryopreservation of honey bee semen which can be thawed later and used to inseminate queens.[9] This has helped to establish the American Honey Bee Germplasm Repository program which the USDA Animal Repository Program is overseeing in their underground liquid nitrogen tanks in Fort Collins, Colorado. This cryopreservation effort serves as a library of honey bee genetic stock and is now among the tanks with various other livestock breed germplasm, including bull, horse, swine, and poultry of varying strains.

Through backcrossing inseminations, they are able to reach 97% of the original stock line. This process is not only deliberate but requires a keen attention to detail and the ability to rear and incubate virgin queens, and to continue the collection of semen. The resulting fertile queens are prized *seeds* which are then distributed to queen breeders and queen producers around the nation for integration into their breeding and production programs. In this way, the Sheppard lab is able to share these seeds with those who can then produce more for distribution to beekeepers across the nation.

The analogy to seeds carries a lot of meaning. Not only in that a seed contains genetic information, and a toolkit for coping with varying stresses and environments, but also because it can be shared, grown and shared again and again. Honey bees in the U.S. are not only derived from these recently imported seeds, but initially were imported with immigrants to this brave land. Honey bees, like many of our ancestors, are immigrants to this country. They have learned to adapt and have become

[5]Zmarlicki, C., & Morse, R. (1963). Drone Congregation Areas. *Journal of Apicultural Research, 2*(1), 64-66.

[6]Cramp, D. (2017). The use of an unmanned aerial vehicle (UAV) to investigate aspects of honey bee drone congregation areas (DCAs). Journal of Apicultural Research, 56(2), 172-174.

[7]Sheppard, W., & Meixner, M. (2003). Apis mellifera pomonella, a new honey bee subspecies from Central Asia. Apidologie, 34(4), 367-375.

[8]Imms, A. (1921). Isle of Wight Disease in Hive Bees. Nature, 107(2687), 283-284.

[9]Taylor, M., Sheppard, Walter S., & Washington State University, degree granting institution. (2016). Old world honey bee (Apis mellifera) populations : A genetic resource for U.S. honey bee breeding. Pullman, Washington]: Washington State University.

the backbone of American agriculture. They have been nurtured and tortured and continue to survive despite the challenges.

My own queen breeding program based in the Rocky Mountains of northern New Mexico, has its roots in Michigan and Florida. Learning from queen producers and now queen breeders in several states has really helped me to not only better understand the relationship between breeding and rearing, but how my apicultural practices can evolve to promote quality, and thus, longevity of my stock. I'm continuing to dedicate my apicultural career to the quest and breeding of quality stock lines. I'm a die-hard bee as seeds saver and caster.

The moral of this story is that by remembering where our bees come from and tracing their roots, can help us to recognize what traits they carry within themselves and which ones we, as their keepers, can encourage to adapt and cope with our varying topographies, climates, habitats, and all the changes in between. We can support our bees by supporting each other. Talk with your queen producers and support their efforts to integrate quality stock lines. I will end this article with a little poetry to remind readers of the importance of genetics –

Bees as Seeds: Within itself, every seed has a story, formed over millennia- with the power to nurture and adapt; and the magnificence to create life, food, and medicine for the world. BC

A Picture Is Worth A Thousand Words

Photoshop – the corrective surgeon for bad photos

Introduction

As is so often the case here, the following piece is for me as much as it is for you. My plan is to show you a photo – some are new pictures while some are old – and then we discuss the content of the photo. Alternatively, I may present a written topic for which I do not have supporting photos. Of course, you will have to communicate with me later, but ultimately, our conversation will come together.

A hive bottom that can function as a hive top

Many issues of *Bee Culture* ago, I mentioned this early hive design that I conceptualized and used long ago. Even as a young beekeeper, I frequently did not have the proper equipment on the truck. I would make a promise that, at a later time, I would return with the needed piece of equipment and correct the issue. You know what normally happened.

I particularly had a problem having enough inner covers. Additionally, at the time, I was working on pollination issues. My intent was to have a hive that I could unload without help at difficult pollination sites. Remember, this all happened when bees were plentiful and no Killer Bees or *Varroa* were on the horizon. Bees were plentiful.

As noted in the photo, the top and the bottom are the same pieces of equipment. In this way, I did not need to load bottom boards, inner covers and outer covers. The inner cover was eliminated. Clearly, part of what I did was a variation on typical migratory covers. In common situations, the top cover would be flat, but, as shown in the photo, I could flip it so there was upward ventilation.

The top and the bottom are the same piece of equipment.

A couple of characteristics

A hive tool could easily be inserted in all the joints that had been stuck down with propolis. The boxes fit flush on the truck, but care had to be taken to prevent the ventilation openings from being closed by surrounding hive boxes.

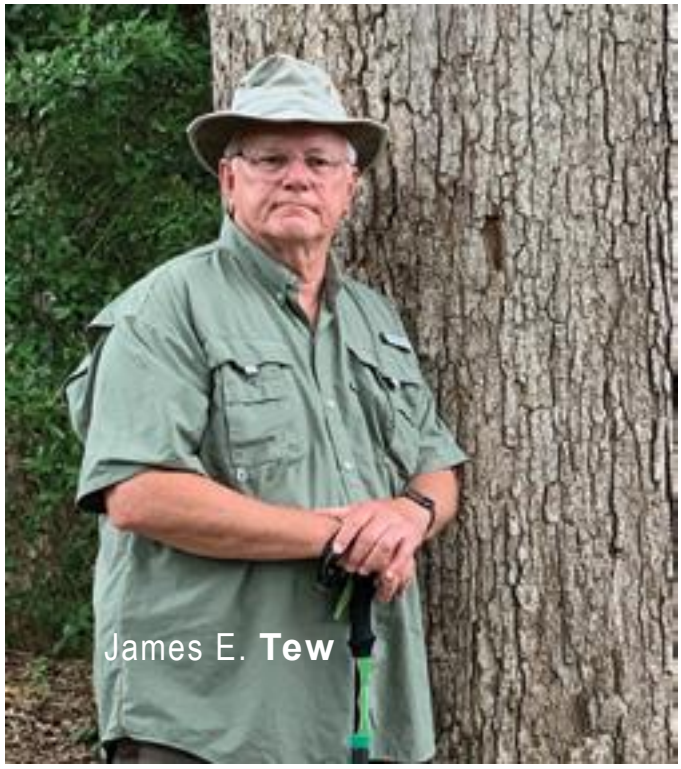
Can you believe it? When I did this tinkering, ratchet straps were not available to the common person. There was an earlier nylon strap device that did not hold fast nearly as well as today's strap devices. You needed a socket wrench to tighten them. I don't miss these old straps. Alternatively, if money were unlimited, one could purchase a metal banding device and metal strap the hive in preparation for relocating. That didn't happen.

In many instances, I just nailed the bottom board onto the bottom hive body. (On occasion, that procedure made it difficult to reverse wintering deeps of bees.)

I used two straps per hive

For each hive to be moved, I used two straps. One ran longways while the other strap wrapped around the hive. Since the top and the bottom could readily slip on the hive body, I put the straps on as tightly as I could. The strapping pressure caused the center of the open bottom and the open top to bow inward. The small wooden block prevented this.

When preparing to move the hives, I used small pieces of screen to cover the entrances. Larger hives containing large colonies would need more ventilation. Now, I would definitely allow for more ventilation.



The opportunity for an odd management consideration arose

Since the top and bottom were the same, and since the hive was strapped tightly, and since the small colony was inclined to swarm, I wondered if I could simply flip the colony upside down. As you know, queen cells always hang downward. What if such cells were bottom-side-up? As a distant comparison, we reverse deeps in the springtime. Not the same, but in the same genre.

The procedure worked, but not well enough to become the bee hive management rage. Maybe a third to a half of the queen cells were either abandoned or destroyed. Cells that were advanced seemed to emerge okay.

But for all these years, I have always wondered if the procedure would have worked better if I turned them more than once, and if I started before the cells were initiated. How often should I flip the colonies – once every three days – once a week? Would it be practical to flip a two-deep colony? Does the colony need to be fully flipped or could the colony simply be laid on its back? This is a chance for you to be the talk of the next bee meeting. You must be sure to show pics of all your hives laying backside on the ground. Your beekeeper friends will take note.

That's enough of this one.

Enough discussion from me on this topic. The photo that I have presented, to my knowledge, is the only one I have. It took me hours to find it and process it. I had the thought that these are so easy to build that I will knock some out and try them again. Just a wild and crazy beekeeper.

Catching drones without meaning to

Many years ago, when Africanized Honey Bees were atop the list of *greatest honey bee pests of the day*, I worked in Venezuela with ARS scientists. I suppose the story can be told now. Dr. Rick Hellmich, who at the time worked for the ARS Bee Lab, needed to satisfy an aspect of his research project that required marking as many drones as possible. He would then, by searching surrounding colonies, determine how drones drifted around the *"Killer Bee"* beeyard. To confine drones to the bottom deep, we put a queen excluder on the bottom board and set the hive deep on the queen excluder[1]. My role was nothing more than a hot and tired helper.

Upon returning the next day, expecting to – one by one – have to tediously manually catch drones all day, we found that we had accidentally caught maybe a hundred or more drones per colony without lifting a finger. To keep this guessing game going, have a look at the obvious reason we captured drones so easily in the photo presented.

It's easy to see. As I can remember, every hive from which we gathered had the "sag" in the front. Drones could escape from the *sag* openings. Upon returning from their flight sortie, they would enter the hive entrance on the bottom board and become trapped beneath the excluder.

With only a quick perusal of the web, the only zinc excluders that I could find are presently made in Ireland and would likely not match our equipment measurements.

[1]In Bee Culture, **https://www.beeculture.com/beeyard-thoughts-4/**, I wrote more comments about queen excluders in general, and I mentioned this serendipitous observation that Dr. Hellmich and I made. (December 2015)

A look at the zinc queen excluder from the hive front.

However, I suspect that modern-day plastic excluders could be made to work.

I do not have a ready use for hundreds of drones, and I don't have a recommendation for ways to use this drone-capturing fluke procedure. Could it be used to capture swarm queens or colony queens? I don't know, but if I ever need lots of drones, this is an easy way to get a lot them in a short time.

Some unsubstantiated observations I have noticed

While standing around a beehive without rushing to suit up, open the colony and rile the bees. I sometimes just stand around watching and wondering. I am essentially intruding on the bees' personal life. I conjecture that as much as we understand about bees, beekeepers are far from fully understanding the extent of their nature. I clearly state here that my observations are only casual observations and are without scientific merit and/or investigation. If one of my comments touches a nerve with you, maybe we could have an amicable discussion on the matter.

Bees do not necessarily prefer the entrance at the bottom of the hive

Due to my southern experiences managing bees in a hot climate, I normally put one of the upper supers back

Though this photo was to show washboarding behavior, compare the upper and lower entrance activity.

A "Hive Bottom Ventilator"

one-half inch or so. No more than that. This also allows an entrance for ventilation at the back of the hive, but my bees seem to show little interest in that back opening as a useful entrance. It is not uncommon for them to put propolis on the back, upper entrance. Admittedly, propolis appliers will do this on the upper front entrance, but interestingly, they will put the propolis layers an inch or so back within the hive.

Over time, as the bees forage, the bees seem to grow to prefer the upper entrance. Anything could cause that behavior. Maybe the brood nest moved upward. If so, why did it do that, but we will discuss that later. Maybe they do like the upper entrance a bit better. Years ago, Jerry Hayes compared entrance positions and reported that the bottom entrance was essentially the least favored.

So where is this topic going??

Is the entrance at the bottom good for the bees? I have no doubt that it is good for the beekeeper. Which brings me to this unusual photo. I think it was called a hive bottom ventilator or a bottom hive ventilator. I can't remember which.

The purpose of this ventilator was to give crowded bees on the front of the colony a place to cluster within the colony during the warm/hot season. These are the only two small photos I have, and the device was destroyed in the Ohio State, Wooster, tornado of 2010. I constructed this one by the dimensions that I had and, no, I don't remember where I found this suggestion. I suspect it was from an ancient ABC & XYZ of Beekeeping, but I can't be sure.

The "Hive Bottom Ventilator" in place on the hive.

Regardless, one of these things could easily be built from a shallow or section super. I've only seen one and I built it. While it did initially work, I and the device did not have enough time to fully bond before it was destroyed. So, why do I not build another and try using it again? My answer is, "Why do I not do a lot of things that I could do? Time and energy. I don't have enough of either.

We keep our bees in artificial domiciles that are more suited for beekeepers than for the bees that live within our hives. Is the bottom entrance the best place for the bees? Using uncommon devices as the one pictured, should we try to make the bees more at home? I don't know that answer. Maybe some you with more of the requisite time and energy would give it a shot.

Is 57°F temperature engraved in beekeeping stone?

I commonly see early Winter bees foraging for water as low as 40°F. I have no idea why the colony from which these bees are from are so desperate for what can only be a small amount of water. I conjecture that the cluster may be fully formed at 57°F, but some forager will be out on the job at temperatures much lower than that.

Why? I can't say, but possibly the wind is still, and the sun is bright so they are not as chilly as the temperature might suggest. Does the colony need a small amount of liquid water? Has brood production dramatically dropped off? Is the queen thirsty? I don't know and I don't know, but I do know that foragers are out at temperatures that are much lower than the commonly stated 57°F. Maybe the roaming bees have simply not read the correct books.

Thanks for the vermin comments

Thanks to all of you who responded to the issues of how to control (or live with) common hive mammalian visitors. Some control techniques were novel, I'll give you that. Wil M said to take galvanized hardware cloth or fencing and fold along the edges of the building that is under attack. The small part that is folded up is attached to walls of the building. Then lightly bury the longer section that would initially be on top of the grass. Burrowing animals dig at the bend in the fencing and find an impenetrable barrier. I did learn this – I'm not the only one with vermin problems. Thank you for writing.

And thank you for reading this. Please know that I try to respond to everyone who writes, but my email is routinely out of my control. Sad excuse, but it is true. BC

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

A video chat

https://youtu.be/cHGUDvNgJqU

BIGGER PICTURE

Jessica **Louque**

Bee Meetings, Presentations, Topics and Speakers

I was recently reading an email about the upcoming NCSBA yearly Summer meeting. Looking at it, I was a little frustrated not to be able to find all the information I wanted about who was speaking, what the topics would be, or if I was just too dumb to find the right link online. This is the same day that I was reading something from Kim about how it's not easy running a magazine, finding people to write, people who know how to write and know about topics and have time to write, filling pages every month with something people want to read, etc. It made me think about the occasional mind blocks I have when coming up with something to write about each month. I usually try to keep it "tame" writing about homesteading or the bigger picture of our bee work, and occasionally stir the pot with some more in-depth conversations about our research.

There was also a survey on the NCSBA website to give some generic answers to their questions so they know their members better, making me more aware that I am not a typical beekeeper by any means. However, this doesn't mean that I don't like to learn new things, or go to meetings – but what do I want to see, or read about, or listen to on bees?

Some of the things I'd like to hear are pretty much a non-starter at this point. I had a beekeeper ask me the other day why didn't ag chem companies come forward more with the bee research like Bobby and I do on their chemicals.

I explained to her that it is technically published after the EPA receives it, but it's a pretty good rule of thumb that the loudest critics in beekeeping will not believe anything you say, no matter how long you've been doing it or what happened, unless you tell them exactly what they want to hear.

Now, this is not specific to beekeepers by any means, but it does limit the social interactions that most ag chem employees want to have with beekeepers. There are a select few that keep trying, but the suspicions of some beekeepers know no bounds and make a lot of encounters unpleasant. I've experienced this plenty of times. Nothing about honey bees is a cut-and-dried matter, but some people would only agree with a presenter if they said all pesticides were killing the bees and was the only thing doing damage. People can be pretty nasty to others on the internet where you have faceless anonymity, but some people can be just as rude in person. As most of you know, you can have ten good conversations with people, but the one negative guy is the one that sticks with you. I have a particular grudge about this right now with politics because I think things are getting out of hand on both sides that could probably be worked out if people just had respect for one another.

If you are in a meeting and do get to watch a presentation by someone who works for an ag-chem company, think about what you want answered and how to ask it politely. Keep in mind that not everything might be able to be released to the public at that time, so some things have to wait until after the government reviews.

If you have questions about the way the study is conducted, most of these people have enough work in it to explain exactly why everything is done, even when it seems crazy. If you are of the mindset that only what you believe is right, then nothing presented is going to change your mind anyway. Just try to remember that whatever you think of the company itself, these people are spending their own time coming out to talk to your organization, possibly not because they want to, and they may not always have the personality suited to presenting either. These are still just employees, with spouses and families and pets, who have spent an inordinate amount of time working on bees, often taking on beekeeping as a hobby to learn more outside of work, and are not the devil incarnate because of who employs them.

I also like to hear about local pollen and wildflowers and honey sources and pollen sources. Unfortunately, a lot of this is more localized, meaning a larger meeting wouldn't be able to offer as much on specifics. I also only know a small handful of people who can do palynology assessments, and they can only travel so far.

Flower sources are usually a source of interest for most any level beekeeper. Some of the issue with this is that I've been in some meetings where people presented on floral sources and had incorrect information. I'm not going to correct someone on their presentation because it's already not easy for a lot of people to speak in front of a group, but at the same time they are giving wrong information to people. In the long run it's really not that big of a deal if you think that honey bees pollinate tomatoes because somebody will correct that for you fairly quickly. I would highly recommend to any club that can find a member that knows local flora to try to organize a presentation.

This is our first year doing a feeding study after moving back, and we'll get the first round of pollen analysis sometime in 2020. It's my favorite part of the study and I'm pretty excited about it. I've been fortunate to collect this data over the past several years in other places, but it doesn't quite apply in this area because it's so much farther west. It's also interesting because its pollen source is based off of pollen baskets, and not necessarily a honey source. This topic could even be done as a roundtable discussion with people to have input of what they had seen from their bees, or what they had identified in their area.

Varroa seems to currently be a contentious topic. I didn't realize

that some people thought that no one should treat for varroa until I took the NCSBA survey, and I thought it was a joke.

Understanding of *Varroa* biology should be better understood by all beekeepers, as I personally believe this is the worst of all honey bee mortality causes. I've heard Lewis Cauble and Don Hopkins both give some pretty good *Varroa* lessons, and learned a few things from both. There's obviously plenty of online resources, but a lot of times presentations stick better with someone, and there's a person there to ask questions at the end. It doesn't just have to be biology, but also going over treatment options and management practices of all levels for beekeepers. A beekeeper with a couple hives might be able to more intensively manage a hive than someone with a couple hundred hives.

Don's disease and pest workshop is definitely worth signing up for if you attend a meeting with that option, and I highly recommend asking him any questions you have. I doubt there are many people with as much knowledge on not only what works, but what absolutely is a stupid idea as Don.

As the chief inspector for NC, he gets to see the worst ideas and management practices in all their epic failure glory. You can learn from a mistake sometimes easier than from good advice. Obviously I think NC has amazing apiary inspectors, as I've said multiple times in my previous articles, and I've met some pretty good ones from other states, like Maryland (thanks to Toni). If you don't have a relationship with your inspector, this is something you should take upon yourself to develop. You might end up hating each other, but your taxes are most likely what's paying for that job and you should take advantage of what they have to offer. I am pretty sure that Don cries a little when he sees my number come up on his cell phone, but that's okay because he's probably not the only one. At least he still calls me back!

If you are a member of any bee organization, there is probably an officer who has the sole job of lining up monthly speakers for county levels, and multiple speakers for the bigger meetings like state or regional. This is definitely not an easy task. Please speak up to these people and tell them what you would like to hear. Some presentations will not interest you at all, but may appeal to someone else. At least give suggestions because the presentations are there for the benefit of the members. It's supposed to be about what YOU want and helping YOU be a better beekeeper. Most everyone in that position loves to have a good suggestion, even if it's a lead. You might want to have a workshop on queen breeding, so bring it up. Maybe the event organizer doesn't know a queen breeder, but it's a start in the right direction of what the club wants and bee networking could probably track someone down willing to lead the workshop and has the experience to do so. These organizations are only going to be as good as their members, so try to put some thought into it and make your club what you want it to be and what works for you! BC

Jessica Louque and her husband Bobby run Louque Agricultural Enterprises, a contract research business specializing in apicultural studies.

Try Something Different

This is a good month for the local beekeeping club officers to get together and plan the meeting programs for the next several months, even up through February. Beginning beekeeper classes are frequently held in February and March. Then Spring arrives with all its bee-confusion – replacing Winter losses, swarms, nectar flows, and gardening. If members know the programs well in advance it is possible more members will attend. Local clubs do have problems finding speakers. However every meeting does not have to have a speaker – some meetings can have activities that involve the members. It might be interesting to take a brief simple survey before making plans. Just a few questions – such as what would you like for a meeting? – and ask for suggestions. Make no promises, but encourage the members to respond.

Many states have quite a few local clubs. If driving distances are reasonable, send meeting announcements to one or more clubs that surround yours. A neighboring club can be a source of speakers. Get in touch with those local clubs; go to some of their meetings. Keep in touch with their officers for suggestions. Depending on traveling distances, suggest a joint meeting. Such a joint meeting could have a "big-name" speaker with costs (transportation, meals, hotel) shared by both clubs. Offer to trade speakers. Topics such as swarming and swarm prevention have umpteen different approaches. Your club has heard the same information each year so a beekeeper from a neighboring club may say something different.

True, some local associations will be in an area with no neighboring clubs. Is there some interesting speaker, from a university, or from a big commercial pollinating operation, or a large honey producer who would be willing to travel to give a presentation? If the club's treasury is a bit too low for such expenses (travel, hotel, meals) would the members be willing to pay a modest fee in order to have such a speaker? Ask the members!

Problem months for clubs can be November and December. Both Thanksgiving and Christmas fall towards the end of these months. Those clubs with late meeting dates probably figured out what to do years ago. If the meeting dates are in about the first half of those months then meetings would be held. Some clubs have a Christmas party. How has the attendance been? If the participation has been declining then it may be time to make a change. Ask the members!

It does benefit clubs to keep records no matter when meetings are scheduled. These records do not have to be lengthy or complicated. Date, how many attended. Perhaps a weather comment – horrible thunderstorms, icy roads, heavy snow predicted, beautiful weather. Add a word or two about the program and, if a speaker, enthusiastic response or blah, lots of questions showing interest or . . . blah. Was it the topic or the speaker? These records are for future planning, not for sharing with the membership.

Reach out to other organizations for speakers. Are there Master Gardeners or Master Naturalists in the area? National and State Parks have rangers but don't ask them to come during their busy season. States have Forestry Departments and also Wildlife Departments. Speakers from those could do a program on trees and on bears or snakes. If you live in the prairie states research is being done on the prairies to reestablish the flowers. Although presentations on prairies may not be directly on bees or beekeeping, the information is definitely worthwhile. Another topic not quite on the subject of honey bees could be about other bees – bumble bees and the small pollen bees coexist with our honey bees. Is there someone studying these at a nearby university? Meeting planners might also consider someone knowledgeable about ants or yellowjackets and other wasps. Make use of a non-honey bee topic once in a while.

If the members have suggested a topic for a meeting instead of having one person give the presentation, have a panel discussion. Three or four people could be chosen. Depending on the topic, one of those could be a completely new beekeeper. Although the newbee does not have very much experience, the comments may be valuable,

Ann **Harman**

especially if the club is teaching classes and providing mentors. It does not matter if the panel members have differing comments. That's how beekeeping is.

Now to take a look at possible meeting topics. It's the January meeting. The bees, inside their hive, are planning swarming in Spring. Make the January meeting topic Swarms – Prevention and Control. Have a Panel of three or four members, or invite one or two from a neighboring club to be Panel members to give their secrets on swarms. September or October would be a good time to have a Honey Meeting. What is needed is a refractometer – someone in the club has one. And a polariscope – this always fascinates the beekeepers. Have the members bring at least one jar of honey to be tested. If someone produces two or more different floral sources then, of course, bring samples. For viewing with the polariscope a glass jar with no label works very well. A queenline type (no label) is best. This is not really a honey show. It is simply for everyone to see what is in their honey. However some clubs may have their own small honey show. For those who do not enter the honey show a Honey Meeting is for everyone. Encourage the new beekeepers to bring their sample of honey. It is a meeting for learning about producing a good product.

Another honey topic for a meeting could be a Honey Tasting. Have everyone bring small samples of honey. Honey harvested in Spring or Summer or Autumn. The honey can be one from another area or even another country. Buy some different honeys at the supermarket or from a shop. The club can supply some water and cups as well as plastic coffee stirrers (not tiny spoons) for tasting. Be sure to have a little bucket of water and something to clean up drips. Don't leave the meeting room sticky! It is always interesting to find that different people like or dislike different honeys. Remind the members that the tasting is not about finding the one "best honey" of the assortment brought but to explore the remarkable flavors of honey.

There must be a gazillion books about honey bees and new ones appear all the time. Have a Book Meeting. Ask everyone to bring a bee book. It does not matter whether it is a new one just off the press or an old one, even a very old one. It does not matter if two people bring the same book. It does not matter if the owner dislikes the book. The book can be about bees, about bee plants, bee equipment, any bee-related topic. It can be bee fiction. Everyone is going to give a little bit of information about the book brought, even if it is a really bad book (yes, a few do exist). Depending on the number of members attending, it may be necessary to limit the length of time each member has to comment on the book.

It could be necessary to have two Book Meetings in a year. One could be for current books and one could be for old books. If there is a book collector in the club with some really old books it might be interesting to learn about some of the outdated beekeeping practices and beliefs.

Today everyone is taking photos with their cell phones! Photos of anything, of everything. Here is a perfect meeting topic – a Photo Show about bees and beekeeping. This meeting can be done two ways: one would be a Photo Show with categories, judging and winners **or** Photo Display with or without categories with no judging. Yes, the photos should be printed so the meeting place should have a table or two for displaying them.

For the Photo Display ask everyone to bring one photo the member took of bees, beeyard, doing something with bees. The photo can have people in it or not, bees inside or outside their hive, bees on flowers – no particular category of photo. Just have the photos displayed on tables so everyone can see them, ask questions and generally discuss what is going on in the photo or how it was taken. You can be sure that the beekeepers will return home to take more photos for possible display the next time the club has a Photo Display meeting.

Some state associations have a Honey Show at one of their meetings with Photography as one of the divisions. Since photographing bees and beekeeping has become quite popular there may be three separate classes. If there is interest in competition, a local club could have a true Photo Show with categories, a photo judge and perhaps a prize for a winner. Where to find a judge? Is there a local professional photographer in the area who might volunteer to judge? There are many local camera clubs, even in rural areas. Ask if a

camera club member would be willing to judge a Beekeeping Photo Show. It would be nice if the judge would be happy to be paid in honey donated by some of the members.

The club would have to make some rules and plan to inform the members in advance of a Photo Show. Classes could be Beekeeper(s) at Work, Closeups of Bees, Scenes (beeyards, meadows, pollination scenes) or others suggested by the members. Usually there would be first, second and third place winners. One photo could be Best in Show. Having a Photo Show does take some planning and would involve a few of the members. It might be best to find out if there is enough interest in having a Show and also are there club members willing to help do what is needed. If not, then just have the Photo Display.

Having Panel discussions is a good way to get members involved. But don't overdo it by having too many of them. Some topics could turn into a squabble instead of a sensible discussion. Is the state association meeting going to be close to the club area? The usual club meeting could be canceled and club members be encouraged to attend the larger state one. Suggest forming car pools to make transportation easier for those who may not wish to drive. State meetings have important speakers and a trade show.

Has someone in the club made some gadgets to make beekeeping easier? Have a gadget meeting with members bringing their favorite beekeeping gadget and explain its many uses.

Those beekeepers who are selling honey have their own label for their container of honey. Have a label display meeting or a label contest. Is there someone who could give a presentation about what is necessary for legal labels? Beekeepers are designing and printing their own labels. Is there a commercial artist who could speak on good label design?

Think about the countless aspects of honey bees and beekeeping to search for meeting topics. Suppose someone suggests "bee hives" as a topic. Pick any one term apart to find its many possibilities: wood or plastic, Langstroth or top bar or long Langstroth, other styles, brood box sizes, assembled and painted or not, "kits" or not. Flip through equipment catalogs and go online to get ideas for expanding on an apparently simple topic. A funny but true story contest. Stories from beekeepers who remove bees from buildings. Write the ideas down! Review the list from time to time and add to it. When bees are involved in your meeting plans, you'll never run out of topics. BC

Ann Harman plans meetings and helps run bee clubs from her home in Flint Hill, Virginia.

Controlling *Varroa*

A Comparison Of Treatments

David **Bridgers**

North Carolina State Beekeepers Association has established a program of four levels of advancement to determine the proficiency of beekeepers. The different levels are Certified, Journeyman, Master, and Master Craftsman. Some of the requirements for the levels consist of education, outreach programs and several years to reach the next level.

A research project is required to obtain the level of Master Craftsman. My research project was a collaboration with N.C. State University and Dr. David Tarpy on the control of *Varroa* mites. This project was done to help determine what works the best with controlling *Varroa* mites in my area.

In discussing this project with Dr. Tarpy, he advised me that relatively little data had been published regarding "softer" biopesticides for the control of *Varroa* mites. It is essential that beekeepers control mites for the health and survivability of their hives.

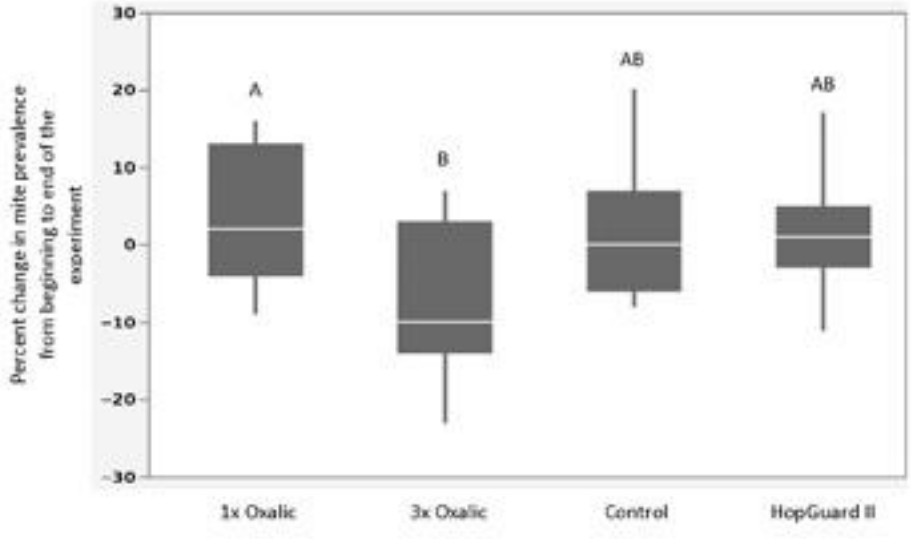
My project consisted of an apiary with 62 colonies of two-and three-story nucs. Prior to the beginning of the project, one colony was removed due to excessive mite load compared to the other colonies in the project. The hives were numbered 1 through 62 with each painted with a different color. I used black, red, green, and blue paint alternating every hive to minimize drifting having any effect on the test results. The apiary was divided into four groups of 15 colonies each. I purchased pint jars and marked them with colors corresponding with the colony number.

One group was a control group that received no treatment, the second group received one (1) treatment of Oxalic Acid, the third group received HopGuard II treatment, and the last group received three (3) treatments of Oxalic Acid once a week for three weeks. The Oxalic Acid and HopGuard II treatments were mixed and administered according to the manufacturer instructions outlined on the respective labels.

The Oxalic Acid was applied using the "drizzle" method. The Oxalic mix was applied with a 50 ml syringe between the frames directly on the bees. All safety precautions listed on the label were followed. I assembled a team of three other local beekeepers and a

Apply Oxalic Acid between frames with a syringe.

This is the collection of ½ cup of bees for the alcohol wash.



NCDA Bee Inspector to assist, provide labor and support for the project. These same people were again asked to participate at the conclusion. I felt this was the best way to keep all task and counts the same for the beginning and conclusion.

At the beginning of the experiment, we installed a sticky board in each colony. Two days later, we collected the sticky boards and samples of bees by bumping a frame of brood with emerging bees in a plastic tub. For the next step, we took 1/2 cup of bees from the tub and placed them in the pint jars.

Alcohol was poured in each jar of bees and sealed. Alcohol was used to euthanize the bees and mites.

We then shook the bees and alcohol vigorously. We then moved inside a garage where we could continue with the alcohol wash and begin to count the mites on the sticky boards and in the alcohol.

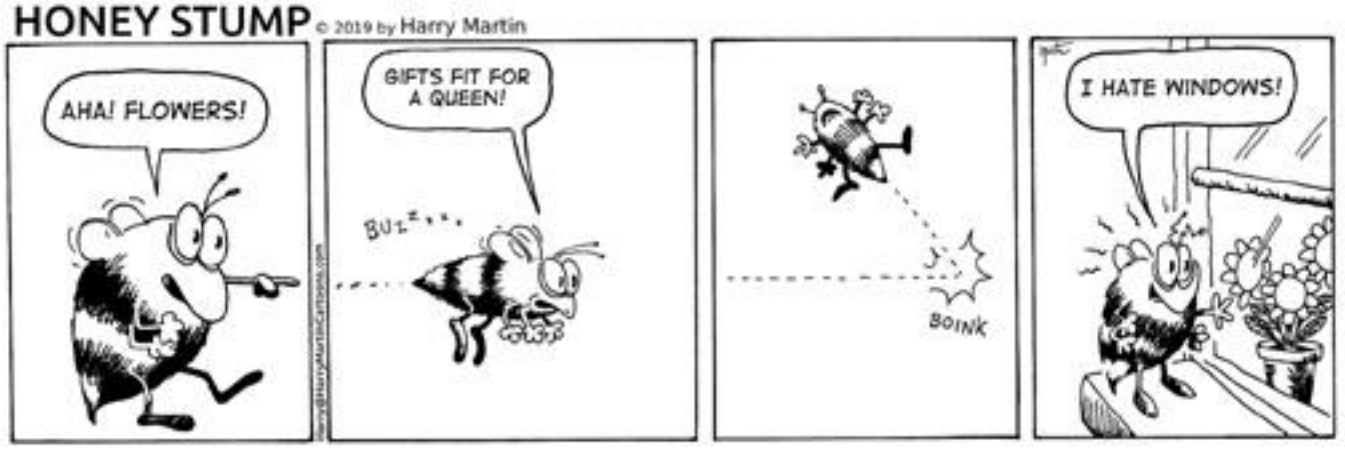
The last step I did was four weeks later at the conclusion of the experiment, we again inserted the sticky boards, and two days later we collected the sticky board and obtained another sample of bees from each hive.

We did the final alcohol wash and counted the mites in the alcohol and on the sticky boards again to get the final count. The tallies were compiled on a spread sheet and forwarded to Dr. Tarpy for a final analysis and he supplied the information in graph form.

We found that there was no significant difference in the mite levels among the treatment groups at the beginning of the experiment. Concluding the three-time Oxalic Acid treatment group had significantly fewer mites compared to the other treatment groups. Treating only once with Oxalic Acid and HopGuard II were not significantly different from doing nothing to control mites. All of those groups had an average increase in mite prevalence over the four-week experimental period.

As a result of this project, I now do an alcohol wash test monthly to monitor the mite load during the Spring and Summer. Not testing for mites will cause a beekeeper to guess at the mite load within the hive. More times than not when guessing, the guess will be extremely low. This will often lead to a hive collapse in the Fall or Winter. When I have bees in an apiary, I pick a percentage of hives to check. I sample these same hives when testing throughout the Spring/Summer. When I find a hive with heavy mite load compared to the previous month, I will do a retest. Doing this retest, I will sample some additional hives. When I test again, and if the second test is still excessive, I then treat with an approved method.

It is my opinion that keeping a watch on the *Varroa* build up during the early part of the year is one of the most important things that a beekeeper can do so his hives will survive to the next season. BC



Honey For A Hangover

Still some kinks, but . . .

Annie **Witzky**

Honey is one of the most popular home remedies available. Who hasn't reached for this soothing syrup when plagued with a sore throat? Amateur honey enthusiasts have proposed that it can be used for anything from a remedy for a toothache to a weight loss supplement. Though such claims are enticing, most haven't been experimentally validated. However, new scientific data suggests that there is one malady that honey could in fact remedy. Hangovers.

Honey as a means to relieve intoxication or a hangover is an idea that has existed for years. However, as in the case of many old wives tales, much of the evidence supporting these claims has been anecdotal. It wasn't until the discovery that honey supplementation can reduce oxidative damage in rats that scientists began to strategically investigate its potential anti-alcohol properties. In 2014, Wei Cao, Jianbin Zheng and collaborators from Northwest University in Xi'an, China published research findings where they had investigated the impact that a twice daily dose of honey can have on chronic alcohol exposure. In a setup designed to simulate chronic alcoholism, mice were given increasing doses of ethanol daily for 12 weeks. Half of the rodents also received a twice daily dose of honey. Not only did the mice who had received the honey suffer fewer liver lesions, but they also had significant reduction in ethanol induced DNA damage, indicating that the honey treatment had a protective effect from the alcohol at both the organ and the molecular levels.

While this initial study did support the idea that honey could lessen alcohol induced damage over an extended period of time, it did not address the potential for honey to directly relieve intoxication or a hangover. The answer to this question came the following year in a study by Xiaoqing Miao, Hong Yao, and collaborators from Fujian Agriculture and Forestry University and Fujian Medical University in Fuzhou, China. In this experiment, the scientists measured the effects of a honey treatment on inebriated mice by observing mouse locomotor activity and climbing proficiency as a proxy for intoxication. (i.e. as mice became more intoxicated, the more quickly they failed the climbing test). Supporting the previous anti-alcohol claims from before, the honey treatment decreased visible intoxication in the mice. To confirm that the mice were truly sobering up, scientists also directly measured blood alcohol content and found that the mice that had received the honey treatment did in fact have less alcohol in their blood. For comparative purposes, the scientists also tested their intoxicated rodent set up with RU-21, an over the counter hangover prevention supplement. Interestingly, mice who had received RU-21 were affected much in the same way as mice who had received honey.

While both of these studies certainly supported the potential for honey to be used as an anti-alcohol supplement, one major question has remained. How and why would honey have protective effects against alcohol? Qun Lu and collaborators from Huazhong Agricultural University in Wuhan, China began to search for an answer to this question in a recent study published in Food Chemistry. In this study, scientists treated intoxicated mice with one of five different honeys and determined that the relative anti-alcohol properties of honey are variable. For example, darker honeys such as *Ziziphus jujuba* honey had a greater effect in lowering mouse blood alcohol content than lighter honeys such as *Schisandra chinensis* honey. When the scientists analyzed the chemical composition of the different honeys, they correlated the robustness of anti-alcohol activity with chemical composition to better understand at a molecular level how honey could help with intoxication. It was evident from their results that several beneficial components of honey likely have a synergistic effect in its anti-alcohol properties. Honeys with a high level of fructose that are rich in antioxidants such as phenolics, ascorbic acid, and minerals tend to be more effective in lowering blood alcohol content. Since alcohol induced oxidative stress is believed to be a contributor to hangovers, the authors conclude that this is a logical correlation. Honeys with more antioxidants should be able to better relieve oxidative stress and alleviate the effects of intoxication or hangover.

Although this is a new and exciting development in honey research, its best that readers don't reach for their wine glass and honey jar just yet. The scientific evidence supporting honey's anti-alcohol properties comes solely from experiments that were done in mice that were given high doses of honey. In the latest study, mice were given 10 g of honey per 1 kg body weight. This might not seem like much, but an adult weighing 150 pounds would need to consume a whopping 1.5 pounds of honey to match that dose.

Clearly, there are still some kinks to work out in honey hangover remedy. But, as scientists continue to learn more about the components of honey that drive its anti-alcohol properties, it might not be long before this is the new trending home remedy. BC

GLEANINGS

AUGUST 2019 • ALL THE NEWS THAT FITS

OBITUARIES

Adrian Waring, NDB (1940-2019)

Adrian was born in Tutbury in Staffordshire. He was the middle of three children with an elder brother and younger sister. His father was a skilled crystal glass cutter at one of the local glass works. His mother was a remarkable woman. She went totally blind soon after Adrian was born and then brought up the three children.

Adrian's father wanted him to be a teacher so he went to train in Kingston-Upon-Hull. He was friends with Beowulf Coopers, the founder of what became the Bee Improvement and Bee Breeder's Association (BIBBA). With membership number 62, he was proud to be the longest-serving member of the Association. The next valid number after his 537.

Eventually, he quit teaching to become a postman as this gave him afternoons to work on his bees. However, in 1979, the opportunity arose to become assistant to the North of Scotland beekeeping advisor, Bernard Möbus, and Adrian and his mother moved to Aberdeen. He moved to Northamptonshire as county beekeeping instructor in 1981.

We met when I attended his introductory beekeeping course. We married in 1983 and moved to Little Addington where we had sufficient land to accommodate the bees—and the cows, pigs, sheep, chickens, ducks, geese, turkeys an cats at various times.

Adrian held the National Diploma in Beekeeping, the highest beekeeping award possible, and served on the NDB Board. He was very interested in the swarming process and its control and worked out a method of swarm control without finding the queen. Another great interest was queen supersedure.

Having served on the executive and other committees of the British Beekeeper's Association (BBKA) in the early 1980s, Adrian was appointed general secretary in 1994, a post he held until 1999. During this time, he promoted bees and beekeeping in the media, appearing on BBC Radio 4 with John Humphrys, Gardeners' World with the late Geoff Hamilton and a beekeeping series on Channel 4. He represented BBKA in contacts with the government.

He served as chief steward of beekeeping at the Royal Show and was active in presenting the BBKA displays at Gardener's World Live and other events.

Adrian lectured in almost every English county and often commented that he had spoken in every one of the places shown on the TV weather map.

Adrian wrote many articles for the bee press and authored the new addition of Teach Yourself Beekeeping in 2006. We co-authored the next edition, Get Started in Beekeeping, in 2015 and also the Haynes Bee Manual in 2011. Much of his wisdom and experience with bees is included in these volumes.

Clair Waring,
Editor of Bee Craft

Dr. Robbin Thorp, a global and legendary authority on bees and a distinguished emeritus professor of entomology at the Univ of CA, Davis, passed away June 7 at his home in Davis. He was 85.

A member of the UC Davis entomology faculty for 30 years, from 1964-1994, he achieved emeritus status in 1994 but continued to engage in research, teaching and public service until just before his death.

A tireless advocate of pollinator species protection and conservation, Thorp was known for his expertise, dedication and passion in protecting native pollinators, especially bumble bees, and for teaching, research and public service. He was an authority on pollination ecology, ecology and systematics of honey bees, bumble bees, vernal pool bees, conservation of bees, native bees and crop pollination, and bees of urban gardens and agricultural landscapes.

In retirement, Thorp co-authored *Bumble Bees of North America: An Identification Guide* (Princeton Univ, 2014) and *California Bees and Blooms: A Guide for Gardeners and Naturalists* (Heyday, 2014). He was active in research projects and open houses at the Bohart Museum of Ent and the Häagen-Dazs Honey Bee Haven. He monitored bees in the Häagen-Dazs Honey Bee Haven, a half-acre bee garden on Bee Biology Road operated by UC Davis Dept of Ent. and Nematology. He established a baseline in 2008 and detected more than 80 species of bees.

He received his bachelor of science degree in zoology (1955) and master's degree in zoology (1957) from the Univ of MI, Ann Arbor. He earned his doctorate in entomology in 1964 from UC Berkeley, the same year he joined the UC Davis entomology faculty. He taught insect classification, general entomology, natural history of insects, field entomology, CA insect diversity, and pollination ecology from 1970-2006.

Highly honored by his peers, Thorp was named a fellow of the CA Academy of Sciences, San Francisco in 1986; recipient of the Edward A. Dickson Emeriti Professorship of UC Davis in 2010; and recipient of the UC Davis Distinguished Emeritus Award in 2015. Other honors included member of the UC Davis Bee Team that won PBESA's Team Award in 2013. He was past president (2010-2011) of the Davis Botanical Soc, and former chair (1992-2011) of the Advisory Committee for the Jepson Prairie Reserve, UC Davis/Natural Reserve System.

Eric Mussen, Extension apiculturist emeritus: "We should not forget Robbin originally was hired to work on honey bees. His greatest area of expertise was the use of honey bees in almond pollination. Robbin determined that until the colonies reached the population size of six frames of bees, they did not have enough spare bees to serve as foragers (pollinate almonds) since they were all needed to keep the brood warm. "

His wife, Joyce, preceded him in death. Survivors include three children, Kelly, Katie and Jeff, and stepchildren Donna and Steve Gary.

CALENDAR

♦INTERNATIONAL♦

2019 Beekeeping Tour to Cuba, November 9-17. Learn how the Cubans do it!

Arrangements by: Transeair Travel LLC 2813 McKinley Place NW, Washington, DC 20015, 202.362.6100 **blubic@aol.com Website: transeairtravel.com**.

Apimondia 2019 held in Montreal September 8-12. For more information visit **Apimondia2019.com**.

♦ALABAMA♦

The North Alabama Beekeepers Symposium will be held August 17 at Friendship United Methodist Church, Athens.

There will be presentations on queens, drones, mites and more.

For information contact **n4wm@bellsouth.net**.

♦GEORGIA♦

Georgia Beekeepers Association will hold their Fall meeting September 26-28 in Cumming.

Speakers include Jennifer Berry, Leo Sharashkin, Clarence Collison and Lewis Bartlett.

For information visit **www.gabeekeeping.com**.

♦INDIANA♦

Indiana Fall Conference and Workshop will be held October 25-26 at French Lick Springs Hotel.

The keynote speaker is Randy Oliver.

For more information and to register visit **http://indianabeekeeper.com/**.

♦LOUISIANA♦

The USDA Honey Bee Breeding, Genetics and Physiology laboratory and the LA State Beekeepers Association will hold their 23rd Annual Field Day November 2 at the lab, 1157 Ben Hur Road, Baton Rouge. Rain date November 9.

Gates open at 9:00 a.m. with program starting at 10:00 to 3:30 p.m. The fee is $35/adults, non-refundable. Pre-registration begins Ocboter 2.

For more information visit **labeekeepers.org** or contact Frank Rinkevich, 225.276.3998 or **frank.rinkevich@ars.usda.gov** or Joe Sanroma, 318.346.2805. For questions regarding online registration contact Jennifer Brown, 601.493.3447.

♦MISSOURI♦

Missouri State Beekeepers Association Fall Conference will be held October 18-19 at Moberly Area Community College, Moberly.

Keynote speakers include Peter Borst and Krispn Given. Others include Collin Wamsley, Casey Berthoud, Dheldon Brummel and more.

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

♦NEW YORK♦

Beekeeping For The Future November 16, 9:00 a.m. to 5:00 p.m. at The Pfeiffer Center, Chestnut Ridge.

Registration is $95.

Instructor is Bill Day.

For information visit **www.pfeiffercenter.org/workshops**.

♦OHIO♦

Lorain County Beekeepers Association 100th Anniversary Celebration will be held October 5 at the Lorain County Fairgrounds starting at 5:00 p.m.

All area beekeepers are welcome.

For information visit **www.loraincountybeekeepers.org**.

♦VIRGINIA♦

Principles & Practices of Biodynamic Beekeeping, Part Four: Fall & Winter - September 7 at Spikenard Honeybee Sanctuary.

For more information visit **www.spikenardfarm.org**; **info@spikenardfarm.org** or 540.745.2153.

Farming & Gardening: Biodynamic Principles and Practices - September 26-28 at Spikenard Honeybee Sanctuary.

For more information visit **www.spikenardfarm.org**; **info@spikenardfarm.org** or 540.745.2153.

♦WASHINGTON♦

The Northwest District Beekeepers Association will present an education and fun conference, September 21 at the Snohomish PUD Auditorium. The cost is $20/NWDBA members and $30/non-members. Seating is limited to 300 and expected to sell out.

Speakers are Andony Melathopoulos, Randy Oliver and Kevin Oldengurg.

To get your tickets visit **https://www.brownpapetickets.com/event/4248173**.

♦WEST VIRGINIA♦

WV Beekeepers Association Annual Fall Meeting will be August 23-24 at the Robert H. Mollahan Building of the WV High Technology Complex in Fairmont.

Featured speakers are Jamie Ellis and Dwight Wells.

For information visit **www.wvbeekeepers.org**.

Display Advertisers

If you are having an annual meeting or teaching a beginning beekeeping class, we are happy to send you magazines to give to your attendees and students. BUT – we need to receive your request four weeks before your event so that we have time to process your request. Please email Amanda at Amanda@BeeCulture.com with the number of magazines needed, a complete mailing address and a contact person.

I was half kidding when I said, "Marilyn Dearest, you don't own a hula skirt, do you?"

I was stunned when she said yes. I knew she had a lot of outfits, but "hula skirt" was a long shot.

"Well put it on," I said. "I want a photo of you doing a *Varroa* mite sugar shake wearing that skirt, for the Colorado Beekeepers (CSBA) newsletter!"

"Oh, that'll be fun," she said.

I was waiting for her when my phone rang.

"Where are you?" Marilyn said.

"At the bee yard. Come on down!" I said.

"What do you think I'm crazy? I'm not going down there in a hula skirt!"

"These gentle little darlings would never sting a Hawaiian dancer!" I countered.

"Come on up by the house, and I'll do a hula shake," she said. "You're not going to submit this to *Bee Culture*, are you?"

We know how to have fun down on the farm, but we had a hectic week preparing for the CSBA Summer bee college. On Friday we hosted a backyard potluck, with camping on the farm, so we needed an outdoor toilet. The first place I called said, "$275 for the weekend."

I said, "I don't want to buy this thing, only rent it!"

The second Porta-Potty purveyor quoted me $182. I said, "I don't need one with a golden seat." He said, "I already gave you a deep discount."

I hit pay dirt on my third call and rented a perfectly serviceable toilet for $100. We put it in the shade of a plum tree.

Jewels lost her commercial pilot job when the airline's new uniforms made her sick. They look sharp but are made from a witches' brew of toxic chemicals. The poor child! She must have felt like a honey bee in the almonds.

Jewels is wildly enthusiastic about bees and beekeeping but lacks experience. I told her I heard a rumor Paul was looking for a hand. You can't beat working for a commercial beekeeper to shortcut your way to successful beekeeping. If you pay attention, you can learn more in a Summer than you'd ever figure out on your own, in a lifetime.

I lost my wholesale pollen market when the international company I was selling to backed out of the U.S. market. They used my pollen for raising bumblebees for hothouse operations. After they folded, I tried to get back with their competitor, also in the bumblebee business. The competitor told me they'd farmed out their pollen buying to a third party. So I called the third party. He said he'd love to buy my pollen. When I asked what he paid, he threw me a low ball.

Look, I had a lucrative arrangement. Maybe I got spoiled, but I'm not interested in taking a pay cut. I'm downsizing anyway. My almond pollination connection went south. Here in my neighborhood, I watch farmers plow up bee-nutrient-rich alfalfa to plant wind-pollinated hemp. Now I'm offered half what I got before for pollen. Is somebody trying to tell me something?

Ever since I advertised my bees for sale, I've been getting calls from all over Colorado. Mostly they want nucs, and maybe (It's June as I write) it's a little late for that. But they want nucs. When I run out, maybe I can sell more double-deeps.

You'd be surprised how set in their ways beginner beekeepers can be. They want a nuc in June, even if a double-deep is more bang for their buck and a better bet to make it through the Winter. They're dead set on a top bar hive, or a Flow Hive. You can't talk sense into somebody whose mind is made up. My clients do sometimes listen when I encourage them to buy two hives, just in case one fails.

Some people want to put their newly purchased nuc in the backseat of their Honda Civic and then drive five hours home in hot weather. I discourage this. If these were experienced beekeepers, I'd say "Go for it!" But folks buying nucs are generally not experienced beekeepers.

I sometimes feel a little guilty selling bees to people who have no idea how to take care of them. Derrick won't do it. He told Marilyn he feels he's killing his bees when he sells them to newbies. The success rate for first-year beekeepers successfully over-wintering their colonies around here is abysmal. Every Spring beekeepers who lost their bees shop for nucs or "wait on packages." They wonder why their hive died. You tell them about mites, and their eyes turn glassy. They assure you they never saw any mites. Here I am taking their money, while I rain on their parade. I tell them about the bee college. You wouldn't believe the "I can't make it!" excuses I hear!

But I was green as grass once, too. Folks helped me along the way. Bees made me a happy man.

Now I have more bees than I can get rid of, and no regrets. I just want to go fishing.

There's another Ann Harman, another Ross Conrad out there somewhere, looking for bees. Bob's making the long haul from Pueblo this evening to pick up a nuc and a double-deep for his son. Maybe his kid's got the fire in his belly. Maybe he's the one.

Ed **Colby**

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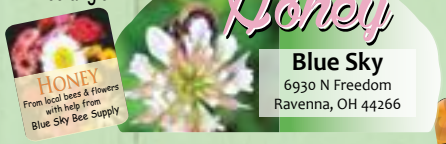

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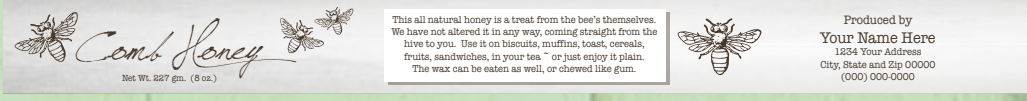

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