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Bee Culture

July Features . . .

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Honey bee on Purple Loosestrife, blooming now. Photo by Jeff Hendershot

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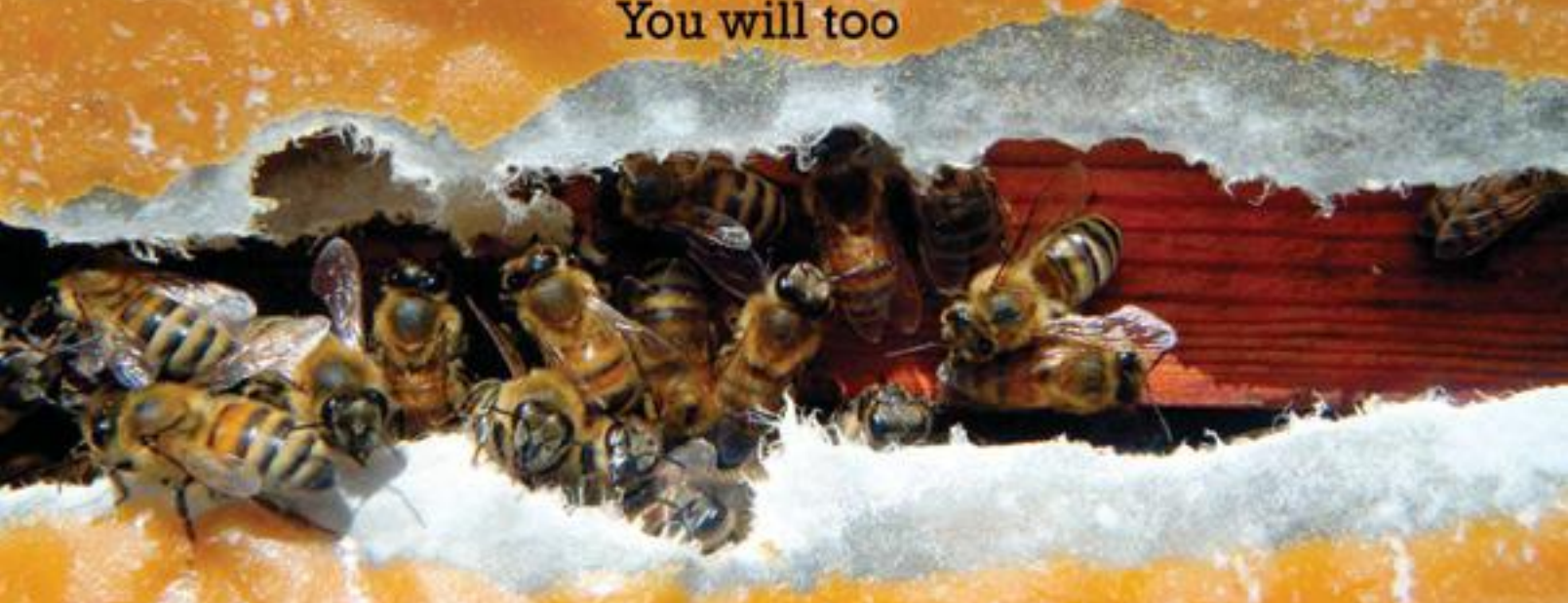

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Bigger Picture

I wanted to write and say how much I appreciate Jessica Louque's article on the "Bigger Picture" and the difficult relationship between pesticides and beekeepers. It was informed and nuanced in discussing the sometimes uncomfortable relationship we have with the compounds used to control pests. I have encountered a number of zealots who denounce all chemicals outright (sometimes while they smoke a cigarette or chew tobacco) and I mistrust anyone who says they have "simple" answers.

I appreciate her thoughtful weighing of pluses and minuses in order to determine the "best practice" where these compounds are concerned. I am also wary of conspiracy theorists who believe big Ag is trying to profit as we are poisoned. To quote Jessica "chemical companies do not want the public relations monstrosity that comes with a bee kill even when it is unintentional."

I also wanted to write because I know there will be plenty of vocal fanatics critical of her thoughtful article and scientifically valid work. Thoughtful and scientific; I'm with you Jessica!

Matthew Teronde

Question For Ross

Thanks for your articles in *Bee Culture*!

We grow certified organic fruit and appreciate your gentle approach.

My question is in the May 2018 issue of *Bee Culture* on page 86 there is a picture of your apiary. All box configuration show a shallow on the bottom boards followed by one deep. Do you always keep this order?

Colleen Howe-Gregory
Friday Harbor, WA

Ross' Response: *Thank you for your email message. It is always a pleasure to hear from a fellow beekeeper and* Bee Culture *reader.*

Thanks also for your kind words about my approach to beekeeping. The editor of Bee Culture, *Kim Flottom, likes to be aware of reader feedback.*

I do always keep a deep super sandwiched by two shallow supers on my hives, except of course when a colony is just starting out as a package or nuc. When using a system where the main hive consists of two shallows with a hive body sandwiched between them, the positions of the shallows are reversed in spring to help slow down the swarming instinct. This is similar to when the hive proper consists of two deep hive bodies, then the position of each deep is switched.

This is how, in the management system I use, a shallow brood nest "overflow" hive body ends up beneath the deep hive body. A nuc or package of bees begins the year in the deep hive body, and, by the time winter is approaching, has a shallow (or two) of honey above the deep box that contains the brood nest. In the Spring, most of the bees are up in the shallows and the deep is mostly empty, so the position of the boxes is reversed and a shallow on top that contains the most brood is now placed on the bottom beneath the deep. In future years, the two shallows sandwiching the deep are typically switched in Spring as part of the reversing process.

I keep the deep primarily for use by the queen for a brood nest area. I think the queen prefers to lay in the deeper expanse of comb that a deep offers compared to the shallow. The shallows offer an overflow area for the deep brood nest since I prefer to let my queens have unlimited access to egg laying and I don't like to use queen excluders. As such, while my deep hive body has 10 frames, I keep only 9 frames in each shallow. This is the compromise between offering 10 frames in a hive body for maximum egg laying space for the queen, and eight frames for maximum honey storage space in the supers by the workers – since a shallow may serve both brood nest and honey storage roles depending on the year.

I use this system primarily because this is the system I was taught when I began my beekeeping career working for Bill and Charlie Mraz of Champlain Valley Apiaries – and there are benefits. Benefits include: since I prefer to feed my bees honey in the comb when they need feeding, it is easier and more efficient to feed a shallow of honey rather than deeps; it is easier to lift shallows of honey rather than deeps; if a mouse gets into the hive during winter, they typically stay by the bottom board, below the cluster of bees and damage combs in the process. If this should happen it is preferable that shallow combs are damaged rather than more valuable deep ones.

I hope this is clear and answers your question. Thanks again for taking the time to get in touch.

Bee Culture
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mailbox@beeculture.com

Drone Layer

I have a colony exhibiting a behavior that I have never seen before. I wonder if anyone can shed light on it please.

I have a colony with an unmarked and unclipped queen which means she was a late supersedure last Autumn. The colony emerged from the Winter quite strong but, so far, don't seem to have produced a single worker egg. The hive has a large number of drone cells (due to mouse damage) and they are continually being filled with drone larvae but the worker cells are all empty apart from the ones used for pollen and honey.

I have never seen a drone laying queen lay in drone cells only before. If the queen is laying diploid drones in the worker cells I would expect at least half of the eggs laid in the worker cells to be viable and nurtured by the nurses so I can't think of an explanation.

I have been putting a frame of worker brood into the hive every two weeks in the hope that they would raise a supersedure queen but they haven't done that so far. I put the last one in today so if that does not cure the problem I plan to kill the queen. If I do that, of course, I will have little chance of

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Bret Adee – With locations in California, South Dakota, Nebraska, Adee Honey Farms is probably the worlds biggest beekeeping operation. Adee Honey Farms pollinates primarily almonds in California, but also travel to pollinate cherry and apple trees in Washington and Oregon. On top of that they also produce millions of pounds of honey each year. Follow all those bees for a whole year to see how the biggest makes it work.

Mike Palmer – Mike specializes in the Sustainable Apiary using production colonies, nucleus colonies and mating nucs. That strategy gives him enough bees to produce Vermont's prime comb honey and sell queens and nucs to others in the area. He isn't one of the largest but he is one of the best. Learn the how's of this northern, non-migratory beekeepers success story.

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John Miller - John owns Miller Honey Farms which is based in Blackfoot ID but also has locations in Gackle, ND and Newcastle, CA. Like many commercial beekeepers, John trucks his bees to several states for pollination but what John does differently from most is he winters his bees in advanced wintering buildings in North Dakota; something which is virtually unheard of in the commercial beekeeping industry. Come listen to how he makes it all come together into a successful operation.

Ray Olivarez – Carefully chosen locations in Northern California, Montana and Hawaii's Big Island allow Olivarez Honey Bees to offer customers premium-quality queens and bees year-round. OHB is surely one of the largest package and queen providers in the US with specialty climate controlled trailers that allow them to truck packages across the country. In addition to selling queens and packages, Ray's team also provides almond pollination and produces honey. To top it all off they offer a retail store to die for and host a large "Hobby Day" every spring. Sure to be a fascinating 4 hours hearing just how they do it the OHB way.

working out what is going on so I am tempted to keep the offending queen just to satisfy my curiosity.

I don't think the colony is happy with the situation because they have become uncharacteristically touchy.

Any insights would be appreciated.

Steve Rose
North Wales

Whazzup at WAS?

Plan to join us in Boise this August to meet and mingle with some of the most influential and knowledgeable beekeepers in the country. Expect some fun! We'll convene the 41st Annual Western Apicultural Society (WAS) Conference on Friday, August 3, at the brand-new, eclectic, and undeniably unique Jack's Urban Meeting Place (JUMP), a venue that truly offers something for everyone.

Jennifer Berry and Randy Oliver will open with updates on current research projects. Dr. Dewey Caron will present on "*Varroa*, Forage, Pesticides - HBHC Resources for WAS." The "Two Jerrys of Beekeeping" will tell us about Bayer/Monsanto's current efforts to improve beekeeping (Jerry Hayes) and provide a personal perspective addressing the role of technology in beekeeping's past and future (Jerry Bromenshenk). Sarah Red-Laird will lead a Next Gen session under the moniker, "The Future of Beekeeping is *Ours*!" and also present on "Education Programs, Research Projects, and University Collaboration on the Advancement of Saving Bees." Melinda Jean Stafford will share insights for increasing success in young apiarists.

On Saturday, August 4, Jennifer and Randy will invite a handful of young beekeepers to join them on the outdoor JUMP patio, complete with pop-up apiary. The entire inspection will be visible to the rest of us through ceiling-to-floor windows as well as heard by way of Jennifer and Randy's wireless mics. Dr. Jamie Strange will share the state of the art on bumble bee biology and practical aspects of bumble bee culture. Dr. Ramesh Sagili will provide information on honey bee nutrition and an update on his activities with Bee Informed Partnership. And Ellen Topitzhofer will recount results from years of observations as a member of the Pacific Northwest Tech Transfer Team. Dr. Ron Bitner will present on "Bee-Friendly Farming: Ground Cover for Native Bees." In the evening, we'll be able to observe the practical application of his knowledge at Bitner Vineyards, the location of our annual banquet.

We will conclude Sunday morning, August 5, with a panel discussion focusing on various master beekeeper programs available throughout the country. Panelists will describe their respective programs in the context of ability to provide positive community outreach as well as insight into how to develop a successful program.

The WAS Conference is open to all. Come to Boise August 3–5, learn about recent advances in beekeeping, and enjoy the wonderful summer climate in one of America's most livable

cities. For updates, visit: **www.westernapiculturalsociety.org**.

Steve Sweet
WAS President

Volunteerism

A funny looking and sounding word. However, it is one of the most important words in the beekeeping world. All of the beekeeping organizations I know of are organized and run by volunteers. Our beekeeping club works a booth at the town's fall festival and some regional fairs. They also speak to hundreds of school children at the county's AG Awareness Day and Environmental Awareness Day every year. We recruit volunteers to teach the beginner beekeeping class and to mentor new beekeepers each year. Volunteers are the foundation of any beekeeping organization. Without the volunteer, we would not exist.

With all this being said it is still difficult to recruit volunteers for special events. It often seems people have many reasons why they're not able to help. Some genuinely just don't have the time or have to work during the timeframe of the event. Sometimes, however, the "reasons" are something else entirely. They might

Beetech revolutionising the beekeeping industry

Sitting at a truck stop in California having a coffee, Mike pulls out his smartphone and launches a website. Mike smiles quietly to himself as he has just saved himself an 8-hour round trip the following day. Instead, he decides to spend the day in his office, to finalise his business plan to expand his operations and catch-up on some long overdue paperwork. This entire decision was made in less than five minutes as Mike was able to review the hive temperature and humidity of his hives across seven apiaries. Mike is using a Beebot, an in-hive sensor developed by Bee Smart Technologies, which is saving him time and money, while helping him reduce his hive losses and improve honey yield.

Progressive beekeepers across the USA like Mike are adopting low cost and affordable digital technologies that are transforming a traditional industry. By using the Beebot remote sensor, beekeepers are able to equip themselves with the best possible information to make decisions about inspecting their hives and when to intervene to prevent disease or pest infestation from destroying a hive.

The Beebot helps beekeepers to reduce their risks and operate more sustainably while saving them time and effort

Too often, beekeepers are time poor and therefore they can't invest enough into growing a sustainable enterprise. Being able to remotely access real-time data and information about beehives results in less apiary visits. This means beekeepers can better utilise their time and focus on the other important aspects of their business.

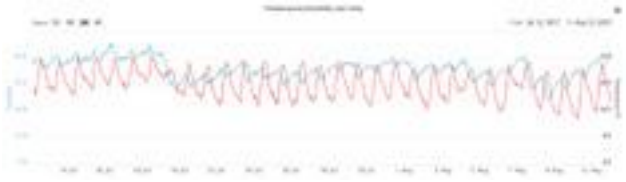
Key Features of the Beebot:

- Completely wireless
- Rechargeable battery lasts 6 to 9 months on a single charge
- Temperature, humidity and sound data recorded every 15 minutes and sent to the cloud three times a day
- Fits on any standard beehive frame
- Beekeepers access the data via an interactive dashboard from their computer, smartphone or tablet

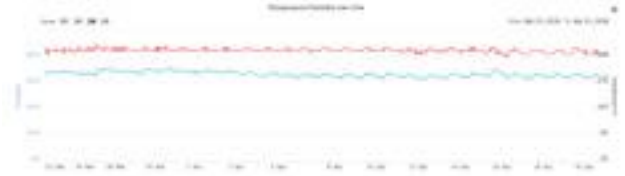
With the Beebot beekeepers move from calendar-based decisions to data-driven solutions

By recording and analysing hive temperature, humidity and sound, the Beebot gives beekeepers a unique insight into their hive 24/7. For the first time, the beekeeper knows exactly what is going on inside the hive without the need to undertake a physical inspection. For instance, by remotely knowing the brood temperature, the Beebot can help detect irregularities in bee health.

The graph below shows a hive with a Beebot that has been affected by American Foulbrood:



As the pest infestation attacks a hive and the colony starts to weaken, fluctuations in hive temperature and humidity are obvious compared to a healthy and strong hive:



Such irregularities will be immediately reported to the beekeeper. This enables pro-active measures and intervention at the earliest possible opportunity in order to prevent further contamination across the apiary.

As we bid farewell, Mike also says his wife loves the fact that he's using the Beebot. "Technology has completely changed my approach to beekeeping as I am making decisions using data rather than the old way of making regular, repeated trips, often for very little value. The fact is, by using the Beebot, I am reducing my costs as I am driving less miles. But more importantly, because I am on the road less, I get to spend more nights at home with my wife. I now have a better work-life balance and have time to grow my business. I also think the bees appreciate it as well as I am disturbing them less. It's a win-win!"

About the author:
Richard Ward is a beekeeper based in Brisbane, Australia and is Chief Strategy Officer for Bee Smart Technologies; the makers of Beebot. E-mail: richard@beesmart.tech

About the company:
Bee Smart Technologies is a small European technology company with global ambitions. Environmental influences, such as residue from agricultural pesticides, bacteria, viruses and parasites, have been contributing to the decline in bee numbers for decades. What's more, the bees' habitat is continuing to disappear. Bee Smart Technologies is comprised of beekeepers who want to make a difference and turn the decline in bee numbers around by using technology as enablers for healthier bees.

have a fear of speaking in front of others or not be sure they can do what you are asking of them. As the primary recruiter for my beekeeping association I stumbled on to, or backed into, what I think is a workable solution to overcome these insecurities.

As we prepared for this year's beginner beekeeping class, we reviewed what we did last year – what was good, what was not so good and what should change. The biggest issue was overcrowding in the beeyard. This made it difficult for all the students to see and participate in the lessons. So, it was decided more hives are needed to create a better student to instructor ratio this year. Our club is small and had only seven students, with one student telling us she was not going to make it to the first of two beeyard days. We set it up so that we had three hives for the class, giving us two students per hive. I now needed to recruit three certified beekeepers to guide the students through a proper hive inspection. We had two. Only one more was necessary to make it work.

I have a military background. I retired after 20 years in the U.S. Army with a tour as a Drill Sergeant and another as an instructor. I wanted uniformity in all three stations. It was important for all the students to get the same information and that all key points were covered. So, I made up a checklist, or cheat sheet, as my volunteers later called it. It was a simple plan which took all the guesswork or doubt out of the equation. I emailed the checklist to all our club's certified beekeepers explaining my plan, looking for at least one more certified beekeeper to help. The response was better than I ever expected. We had three certified beekeepers volunteer! None of which had ever volunteered before.

We had a great beeyard. I could not have asked for anything to turn out better. As I walked around and observed the lessons at each hive, which were about 50 feet apart, I was pleased with what I saw. Everyone was engaged and actively participating in the lesson. After we finished, I talked to the instructors (volunteers) and I got comments that surprised me: "This was great!", "I really enjoyed it.", "This was the best time I have ever had working with bees!" When I asked them what made it all work, unanimously it was the checklist. The checklist made it simple and gave them clear cut guidelines to follow. They were not worried about messing up. In addition, they knew I was close by and would step in if they needed help.

To the person who has the chore of recruiting, I recommend you make it simple. Lay out your plan and remove doubt. Give the new volunteer a safety net. In the past I would ask for volunteers to help speak to kids or help with the beginner class and would not get much participation. My request was not to the point. It left way to much out. You know what has to be done at these events. You just need to spell it out and I think you will get a better response.

To the volunteer I would say, ask the questions up front. Let your concern be known. It is not unreasonable to ask what exactly will be expected of you. Don't

be worried about messing up. You have more experience and knowledge about the subject matter than your audience. You will get more out of it than you expect.

In the future, I will provide a written lesson plan early on that explains what we are doing, where, when, why and how. I honestly think the response will be better, We will get more people involved. In turn, getting involved will build confidence in our members making our beekeeping association stronger and more impactful.

While this may or may not help you and your beekeeping organization, I will say it's worth worth a try. In my situation I was willing to try anything. It was great to see new people get involved and enjoy what they were doing.

Our beekeeping association, the Yadkin County Beekeeping Association, was honored this year as the Yadkin County Volunteer of the Year by the Yadkin County Agricultural Extension Office at the annual volunteer appreciation celebration. We must be doing something right. I look forward to working with our exceptional members/volunteers at our next big event.

Ronald Duncan
Hamptonville, NC

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Critter Technology has recently introduced REPELANT™, an ant barrier coating scientifically developed to be a non-toxic, low maintenance deterrent from ant infestation. The coating works by preventing the ants from attaching to an inclined coated surface. They rapidly fall off and do not make it to the attractant. REPELANT™ is not a pesticide and the dried coating is environmentally safe and stable to environmental exposure. The coating has been field tested to protect beehives from ant infestation for more than eight months with no maintenance. See videos of repelANT™ in action at **www.repelANT.com**.

The sides of the compartment on the left side of this dog food bowl were treated with REPELANT™. Both sides of the dog food bowl were baited with dog food and it was left outside for several hours. Ants were only able to reach the dog food that was placed in the untreated (right side) compartment.

I would like to offer the following information about a new and unique product my daughter and I have assembled and currently being sold on Amazon. It is the first time either of us has ever tried to market an item and, as I told my wife, "I think I just spent $450 to learn a lesson." I would love for a Beekeeping Supply Company to pick this up.

The product is called "Go Cork It" and includes a useful beekeeper's informational laminated card. Thirty years ago when I first started beekeeping I bought a smoker and it included a cork but it was soon lost, replaced and lost again, hence the idea for a cork that couldn't get away. Corking is safer and more convenient than trying to stuff grass or newspaper into the end of the smoker. In addition the two side laminated card has information on queen color codes, queen cell identification along with helpful bottling conversions and a reminder of legal moisture content requirements.

Here is the link on Amazon: **www.amazon.com/Smoker-Topper-Stopper-Essential-Information/dp/B07BQZTTYL/ref=s-**

Honey Sweetie Acres is an organic skin care company that started in 2011 out of necessity. My husband was suffering from a skin condition that dermatologists were unable to help. Having made soap in the past for the family, I decided to include goat milk due to the benefit of the lipo-proteins for the skin. After a few weeks, his condition greatly improved and eventually disappeared completely.

This prompted us to consider a new business making products using goat milk and avoiding harmful ingredients. Our signature line is our goat milk soap and lotions made from Nigerian Dwarf Goat Milk which has the highest cream content of any goat breed. We use organic honey in our soaps and lotions as a beneficial anti-oxidant. Honey is also a wonderful natural lather agent for soap. Our soaps are available in some Whole Foods, Earth Fare, Fresh Market and on our website (**www.HoneySweetieAcres.com**) and farm store located in Goshen, OH.

We have expanded to lip balms using certified organic beeswax & USDA certified organic oils. We also make goat milk facial cream, lotion bars, sulfate free shampoo and essential oil based liquid hand soaps.

With a background in chemistry and certification in aromatherapy, we are uniquely positioned to formulate safe and effective natural skin care products. Our mission is to help customers live a healthier lifestyle by being aware of the ingredients in personal products. The skin is the largest organ of the body and what you put on it matters as much as what you put in your body.

New from GloryBee – Pre-wired 9-1/8" Wood Frames

Tradition with Efficiency

Wood frames with wired foundation are the preferred combination of frames and foundation for traditional beekeepers. However, due to how time-consuming and laborious it can be to install and wire beeswax foundation onto wooden frames, this combination has grown less popular over the years as new, more efficient forms of frames and foundation have been developed.

From our experience, it's not only more natural but also much easier to get a newly installed package of bees going on 100% pure beeswax foundation. Since they produce it, bees prefer pure beeswax foundation over any other type. Now there's a way to have the best of both worlds with GloryBee's Pre-wired Wooden Frames!

Features:

- High quality, pre-assembled wooden wedged top bar, grooved bottom bar frames
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- Use with 100% pure beeswax 8½" crimp wired foundation with hooks
- Bees will draw foundation out faster with more uniformity and few irregularities such as bridge comb

For more information and a video, visit **https://glorybee.com/beekeeping/wood-frames-frame-parts/pre-wired-wood-frames-9-1-8.**

Bees On Board Stickers

Looking for a bit more space on the road? Worried about leaving your hive tools in the car sometimes? Perhaps we can help!

Car-friendly weather resistant vinyl laminate stickers, looks great on windows or bumpers, available in two sizes: 5" x 5" and 3" x 3"

- Six 5" x 5" stickers: $20, shipping and tax included.
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Please contact us directly for pricing on larger orders.

Profits benefit the community projects of the Center for Urban Bee Research, a 501(c)3 educational nonprofit based in Washington, DC.

Mail payment and shipping instructions to: Center for Urban Bee Research, 318 12th Street NE, Washington DC 20002

Order online at **www.dcbeekeepers.org/stickers**.

BUZZ: The Nature and Necessity of Bees. By Thor Hanson. Published by Basic Books ISBN-10: 0465052614, ISBN-13: 978-0465052615. Hardcover: 304 pages, black and white, Publisher: Basic Books (July 10, 2018), 8.5"x 6"

From the Publisher…

Modern bees are marvels of engineering, with unique aerodynamics, antibiotic spit, and seven distinct sensory organs on their antennae. Evolving alongside flowers, bees brought new shapes and colors to our landscapes. And we humans were not left behind in the playful process of co-evolution, either: the practice of keeping domestic bees proliferated, enabling the agricultural revolution, as we carried hives from field to field from the Ancient Nile to rural America.

In *BUZZ: The Nature and Necessity of Bees* Thor Hanson takes readers on a journey that begins 125 million years ago, when wasps began feeding pollen to their young. From honey bees to bumblebees to lesser-known diggers, miners, leafcutters, and masons, bees have long been central to our harvests, our mythologies, and our very existence. The human relationship with bees goes far beyond crop pollination and the production of wax and honey. Bees have taught us about decision-making, brain function, addiction, and architecture.

BUZZ is a book of wonder, where conscience comes from curiosity, and the irresistible urge to get outside, find a bee on a flower, and settle down to watch.

Thor Hanson is a conservation biologist and Guggenheim fellow. His previous books include The Triumph of the Seeds and Feathers. He lives with wife and son on an island in Washington State.

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Price: $386.20

Uncapping Tank

This tank is the perfect uncapping solution for a small scale beekeeper. The tank will accommodate up to 15 gallons of cappings.

A 1-1/4" plastic honey gate allows for excess honey to be drained through metal grate and out of tank easily. A wooden cross bar is also provided to allow for a stable surface to rest frames on while you uncap.

Price: $72.05

Lyson W229 12 Frame Motorized Extractor

The W229 extracts twelve medium or shallow frames radially. Includes two FREE tangential deep inserts which allows you to extract two deep frames at a time.

This small-size extractor is a great option for a hobbyist with one or several hives!

Price: $845
with ***FREE*** shipping to a commercial address!

Fume Board

Fume boards are a efficient way to drive bees from your honey supers. The fume board is placed above the honey supers after you have sprayed it or applied bee repellent. After about 5-10 minutes, you can remove your emptied super.

Price: $13.95

Bee Quick

Bee Quick is a natural honey harvest product with no offensive odor, which works quickly and effectively to remove bees from supers.

Price: $15.71

Triangular Escape Board

This method is the most stress-free way to remove bees from a honey super. It is easy for the bees to leave with three convenient exits. However, they are unable to get back in!

Price: $13.95

Bee-Go

Bee-Go is a chemical that quickly chases bees from supers on hot or cold days.

Price: $18.49

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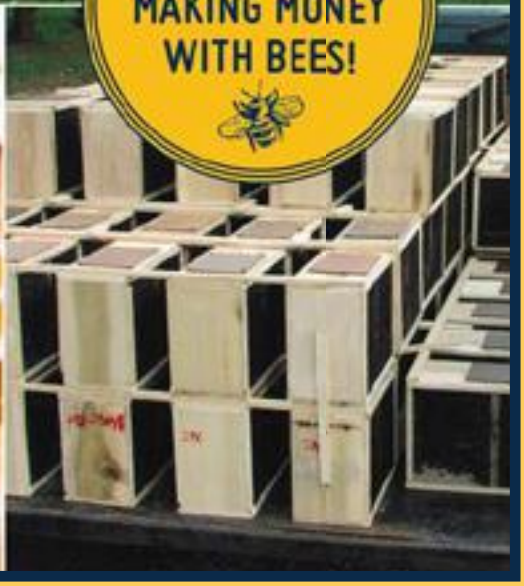
KIM FLOTTUM

In Business with Bees

How to Expand, Sell, and Market Honey Bee Products and Services Including Pollination, Bees and Queens, Beeswax, Honey, and More

PROVEN STRATEGIES FOR MAKING MONEY WITH BEES!



Ready to take your beekeeping skills to the next level? *In Business with Bees* provides the answers you need.

"The only way to save the honey bee is to save the beekeeper. All the rest comes in second," says bestselling author and beekeeping expert Kim Flottum. Here, Flottum shows you how to save bees, beekeepers, and your business. He'll take serious beekeepers past the early stages and learning curves and offer practical, useful advice for converting your passion into a part-time or full-time career with measurable results. This beekeeping business how-to guide offers all of the in-depth answers to the questions you didn't know you had.

- Writing a business plan
- Finding the best sources for funding
- Determining what your facilities will be and how to acquire them
- Getting and installing the right equipment
- Cooperating with other local businesses
- Stocking inventory and managing warehouse space
- Finding customers
- Raising and selling queens, packages, and nucs
- Expanding pollination, including contracts to protect you
- Making and selling peripheral products from wax, propolis, and honey
- Organizing teaching, speaking, and planning events
- Hiring and managing your growing team
- Promoting your business and measuring success

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

"Where was this book when we started? I know that we could have skipped many of the growing pains if we would have had a book like this to learn from and refer to."

— Paige and Tom Bennett, Co-founders of Bennett Apiaries, Inc. (Red Bluff, CA)

"This is a great outline for those interested in making their passion into a business. Here you will find thought-provoking questions and answers to many of the pitfalls that bring businesses to their knees."

— Kimberly and Ben Carpenter, EAS Master Beekeepers and the owners of Hungry Bear Farms™, Ross Rounds™, and SunDance™ Pollen Traps

"How many times has someone, fairly new to honey bees and beekeeping, thought about opening a 'bee business' selling honey, offering pollination services, making endless creative candles and plunged ahead without guidance? And how any times has that dream . . . turned into disaster? This book will show those dreamers the possibilities and realities of creating a successful business, either small or large."

— Ann Harman, international beekeeping author and editor

"A comprehensive book that will guide a new business owner past many obstacles that often result in costly mistakes. It offers proven strategies for managing and marketing a successful bee business. If you are thinking about starting a beekeeping business then read this book."

— Dan and Bonita Conlon, owners of Warm Colors Apiaries (Deerfield, MA) and members of the Russian Queen Breeders Association

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

Due out late July, available at ***www.beeculture.com***

INNER COVER

Right off the bat – Don't forget the *Bee Culture's* 2019 Calendar contest! The topic is All Things Royal – Queens! Retinues, laying eggs, emerging from cells, being fed, Mating – that would be a sure one, as would a drone comet with a queen in front, queens fighting, anything and everything queens, queen banks, queen cells, grafting queens, caging queens, holding a queen in your hand, marking queens. If you got a queen you got a picture. All Things Royal. Don't forget! Send your photos as JPG attachments in an email, only one per email, to **Kim@BeeCulture.com**. If your photo is too large it won't come through. We will respond if we get your photo. If you do not hear back from us we did not get it. Reduce the size/resolution and send again.

•

I was in Florida at the West Palm Beach Beekeepers meeting in late May. It was a short trip – fly in Friday afternoon, talk about making money with bees Friday night, do an outdoor workshop Saturday morning testing for Varroa and on the plane heading home by lunchtime.

Here in Medina the weather had been so unseasonably hot and humid the whole previous week – the five days over Memorial Day weekend, I thought the global warming thing was home to stay. In the 90s with that kind of humidity from Friday to Thursday. Of course air conditioning only breaks when it's hot (like furnaces when it's cold), and ours went out Saturday morning. Getting someone to take a look wasn't in the works over the Holiday, so we did the fans thing or a week. It was tolerable, but hot. And humid. Did I mention it was hot all week?

First thing Tuesday morning I call my trusty air conditioner repair guy and they could squeeze me in sometime late Thursday. By supper that day we had the cool back and life returned to something approaching normal. Of course the weather turned cool again Friday, just as I was getting ready to head to Florida for some more of the same, but at least it was cool here.

There, it was even more of the same. Hot, hot, hot. Humid, humid, humid. I honestly don't know how people live in that oven. Or I didn't until someone there actually explained it to me. Or at least how he understood it.

You actually physically change, he said. Your body produces more blood vessels near the surface of your body, dissipating heat faster and easier so you don't over heat. And you never, never take a cold shower. Warm, heading toward hot he said. That way, when you get out, it's actually cooler than the shower, and you cool down faster. Take a cold shower and get out and you heat up in a hurry, trying to say warm, you get too warm.

I never use air conditioning either, he said. Nope, not ever. Now, I go places where the AC is on and I have to put up with it, but I don't stay any longer than I have to, and I always wear warm clothes when I'm in, like, a grocery store or some place. When he was telling me this, he had a light coat on over a long sleeve shirt and long pants standing in the sun. I was in shorts and a T-shirt and dying a slow death sitting in the shade.

As he was talking, I was looking around at the rest of the folks who were there that morning. Several were wearing sweaters and coats. Now, pants made sense because they were working bees, but almost 90 and a sweater? Wow.

During the flight home, in that air conditioned plane, I got to thinking about all this. Keeping bees in that part of the world is way, way different than in my part of Ohio. We have seasons. They have honey flows as things come and go, but things are always coming and going. I ran into a beekeeper at the meeting on Friday night I used to know when he was living in New Jersey. He lives down there now, and is making a part of his living custom extracting all year long because there's honey to be harvested all year long. An ongoing, continuous honey flow.

If you live there I'm sure you're going – duh! Where you been all your life? And, there are a good number of beekeepers living in that part of the world. And, I'm sure you've heard that all beekeeping is local, but this kind of local is way, way different than almost every book, article, youtube video, magazine story or anything about beekeeping you are likely to find. As a result, much of what folks are exposed to who live in those parts has to fixed, or adapted to accommodate what they face every day. I'm guilty of that.

I've made some assumptions that all things Ohio relative to bees and beekeepers are all things everywhere. Inside, I knew that wasn't right, but it fit for what I was doing at the time, and it was easy to gloss over.

So, small hive beetles all year long. All year long honey flows. Hot all the time. Humid all the time. Rain like Noah used to see, and I suppose termites, ants, lizards (one actually tried to come home with me) and more kinds of blooming plants than

Beekeeping Is Local.
Honey Labels.
Calendar Contest.

you can imagine. It's not a different planet, but it certainly is a world I'll have to learn. And guess what.... wild flower honey there is way, way different than wild flower honey here. Read on.

•

That rush of heat and rain in late May here really screwed up the bloom sequence of a lot of plants. Locust was early, as was tulip popular right on top of it, and basswood came on strong early too. What this did was jam up getting some of these as varietals because they got mixed. The locust got too much color and lost that 'ding' after taste that's so special, and anything approaching tulip popular color had a not-sweet-enough flavor from the locust.

And where this is going is the Honey Report survey on honey labels. Actually, differences in what's on honey labels across the regions we use. Like the climate I experienced in Florida, every region has a local label flavor that I hadn't quite expected.

One of our reporters summed it up for a lot of us – if you know the beekeeper, all the rest isn't needed. If the beekeeper says it's . . . some kind of honey – then you know what you need to know and don't need to know any more. And for a lot of folks that works. Steady customers come to your home or Farm Market stand on a routine basis, you recognize them, know their kids and they buy a one pounder and know it's safe, real and that you made it. That works. Unless you're not there.

And you're not at the store with your honey, or that other farm market, so you're label has to be as good as you are to sell that jar.

For instance. Take a look at question three. Does your label have "Local" on it? Many do, but a lot don't. The rationale is that my address is on it so it has to be local, right? Maybe.

Top labels. Even when you have a Farm Market stand, what folks see is the top of your jar, almost never the front. Not using that space is wasting space. Yes, the label costs. But telling a buyer it's Local, or that you are part of your state's Agriculture program gives a bit more information right off.

We didn't ask, and should have, do you use Wild Flower on your label? I'll bet almost everybody does on at least some of their honeys. When it's a mix, it's wild flower, right? Well, 38% over all do some varietal honeys and label them as such, but that range is as low as 13% to only as high as 68%. Only 38% use a seasonal distinction, such as Spring Beauty, or Autumn Harvest.

Only 25% put Product of U.S. on their labels, when fully 80% of the honey consumed in this country is from off shore. Shouldn't we be screaming from the rafters that our stuff isn't from off shore? That foreign stuff has gotten a lot of serious, and necessary bad press in the recent past, and I'd like to see us get as far from that junk as possible (see below). Another way to do that is to say something like Proudly Made In Ohio or something similar that denotes not only is it US made, but even closer, it's made right here in Ohio. Frankly, I think labels are under used as a promotional device, especially – especially when it isn't us selling face to face.

•

While we're on the Honey Report page, have you looked at the prices yet? Somebody somewhere is getting only $1.35 /lb for light amber honey in the drum! $1.35! You have to make 30 pounds of honey to buy a $40 queen. Meanwhile, somebody somewhere is getting $50 for a 5 pound jar. That's $10/lb, which is about what honey should be. The average price of a 5 pounder, however, is only $27, or just a hair over half of that at $5.40/lb. Meanwhile, the retail price of maple syrup on Amazon runs about $7.50 - $8/lb. sold in 2 pound jugs, almost exactly the same average retail price of honey at $7.50/lb. What am I missing here? A gallon of maple syrup weighs 11 pounds. The range of prices for a gallon last year was $30 - $70, or $2.73 - $6.36/lb. All of this of course negates mentioning the cost of the bottle, label and delivery.

I've made maple syrup, and I've harvested honey. I'd rather make maple syrup than try to keep bees alive, tend to them, get stung and then have to clean up the mess of 40% of them dead every Spring. But then, honey from off shore is coming in at a lot less. India - $0.87/lb., Vietnam - $0.81/lb., Ukraine - $0.90/lb. All just a tad over half of the lowest price on our report this month. But then, you don't get propolis or beeswax from a maple tree, so we do have that.

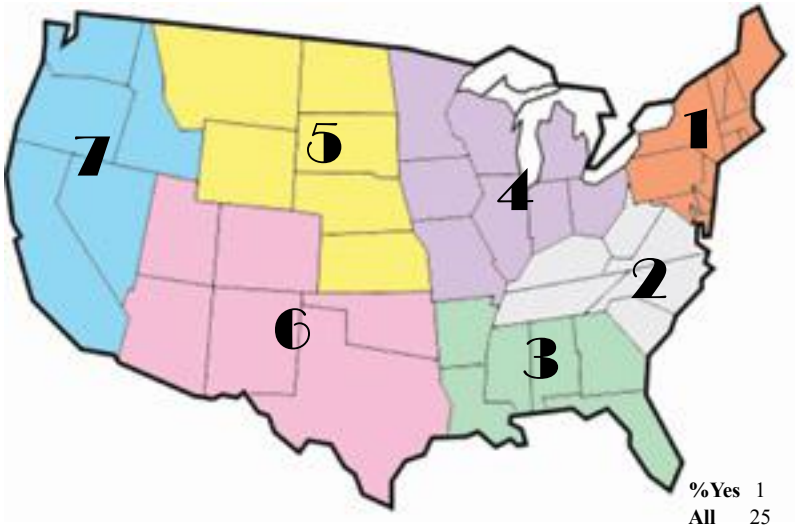
•

But happily, average pollination prices are up. Not a lot, but at least in the right direction. But have you heard? From a mid-June BUZZ - Dropcopter, which uses a drone to pollinate tree crops, successfully demonstrated its Worker-Bee pollinator at the 800-acre orchard, which is home to more than 350,000 trees, in Lafayette, N.Y.

Each year, 400 hives of bees (at an average cost of $86/hive or $34,400) help pollinate Beak & Skiff's crops. However, the potential to have drones supplement the pollination performed by bees (and increasing fruit set 10% -15%) offers the ability to distribute precise amounts of pollen five to 10 feet above the tree canopy (day or night or both) and provide backup support to Mother Nature, explains business accelerator GENIUS NY, of which Dropcopter was a finalist team.

Cheaper, more efficient honey production, and cheaper, better and more efficient crop pollination by a machine. It was only a matter of time.

JULY – REGIONAL HONEY PRICE REPORT



%Yes	1	2	3	4	5	6	7	8	9
All	25	41	65	39	38	33	89	86	38
Regions									
1	12	44	72	68	26	32	100	89	47
2	44	41	78	56	22	45	89	100	56
3	33	35	46	29	14	30	71	86	7
4	50	25	25	13	0	25	100	100	13
5	20	33	83	20	24	20	100	83	22
6	22	67	78	45	45	56	100	79	30
7	0	29	100	57	33	25	100	100	14

Honey Labels

We surveyed our reporters this month asking about the labels they use on their honey jars. We asked yes or no if they used these features. The graph below show overall YES answers, and below for each region. We asked if the following attributes were on their labels:

1. Product of US
2. "My" state
3. Local Honey
4. Varietal – i.e., goldenrod or locust
5. Seasonal – Spring blossom, autumn gold
6. Use a top label for state or Dept of Ag info
7. Name and contact info
8. Weight, pounds and metric
9. Warning about feeding infants

We were somewhat surprised at the variability of each of these label attributes, but it shows how beekeepers share information about their products. Contact and weight info are standard practice in most places, but not everywhere it seems. The rest offer more info for the customer, especially when it sits on a grocery store shelf. Local remains popular but by no means universal. The question, then, is which, if any, of these would help you sell more honey do you think? You may want to consider giving your customers more info in the future.

	REPORTING REGIONS 1	2	3	4	5	6	7	SUMMARY Range	Avg.	$/lb	History Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	2.35	2.19	2.36	2.58	2.26	2.20	3.00	1.74-3.05	2.31	2.31	2.28	2.30
55 Gal. Drum, Ambr	2.19	2.16	2.06	2.43	2.10	2.12	2.75	1.35-3.00	2.20	2.20	2.26	2.22
60# Light (retail)	204.97	184.42	191.25	201.38	189.50	192.93	220.00	159.00-260.00	200.44	3.34	203.03	206.52
60# Amber (retail)	202.76	186.00	190.00	196.35	210.00	191.90	236.67	155.71-250.00	202.67	3.38	201.90	201.29
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	85.44	75.33	90.80	62.00	70.92	85.44	85.44	57.60-123.30	80.43	6.70	83.04	88.92
1# 24/case	119.10	107.53	128.55	114.47	116.01	90.92	128.40	45.00-192.00	119.69	4.99	126.08	124.54
2# 12/case	122.27	95.88	113.58	103.30	99.12	96.00	114.00	78.00-192.00	109.54	4.56	111.26	109.02
12.oz. Plas. 24/cs	104.88	88.60	93.50	82.33	91.80	101.88	97.20	66.00-164.00	94.77	5.26	100.33	100.10
5# 6/case	125.96	109.33	186.00	110.88	114.15	105.00	125.96	71.50-186.00	123.17	4.11	125.30	127.59
Quarts 12/case	163.17	136.75	130.61	163.30	150.66	131.88	144.00	109.20-250.00	146.74	4.08	146.58	150.02
Pints 12/case	104.32	91.75	77.00	107.33	96.48	70.00	84.00	65.00-160.00	96.13	5.34	95.08	93.52
RETAIL SHELF PRICES												
1/2#	5.00	4.34	4.75	3.53	4.53	2.29	6.25	2.29-9.00	4.96	9.91	4.85	4.66
12 oz. Plastic	6.81	5.03	5.04	4.90	5.45	6.57	6.30	3.50-12.00	5.87	7.83	5.77	5.59
1# Glass/Plastic	9.00	6.93	7.38	6.38	7.14	6.37	8.83	4.00-16.00	7.50	7.50	7.39	7.15
2# Glass/Plastic	18.00	10.49	12.36	11.18	11.83	10.50	15.33	8.00-21.00	12.39	6.20	12.09	12.25
Pint	11.25	9.43	8.99	12.96	8.75	10.76	10.35	4.00-20.00	10.51	7.00	10.29	10.02
Quart	19.80	16.12	16.19	16.13	15.53	17.25	19.76	8.00-36.00	17.59	5.86	17.05	16.95
5# Glass/Plastic	38.00	24.75	33.75	23.67	24.41	21.63	42.50	15.00-50.00	27.06	5.41	26.61	26.04
1# Cream	10.78	9.00	10.78	6.00	9.50	8.00	10.50	5.50-18.00	9.82	9.82	9.64	8.82
1# Cut Comb	13.14	9.88	8.33	9.44	9.38	13.14	14.00	6.00-24.00	11.28	11.28	11.33	10.62
Ross Round	8.97	6.75	8.97	9.00	10.50	4.75	12.49	4.75-12.49	9.32	12.43	9.08	8.57
Wholesale Wax (Lt)	6.97	5.25	5.33	5.73	5.50	5.50	7.75	3.00-12.00	6.44	-	6.56	6.17
Wholesale Wax (Dk)	6.38	4.76	4.18	5.83	3.50	3.50	6.38	2.55-12.00	5.49	-	5.69	5.38
Pollination Fee/Col.	93.46	75.00	72.50	85.00	85.00	93.46	85.00	50.00-150.00	86.91	-	83.65	94.13

It's Summers Time –

Chickens, Talking To Children and More –

So, the chicken mystery from last month – 19, 21, 20 – got even more interesting. The daughter of our neighbor claimed the extra chicken and took it home. When her mother took a look she said "Wait a minute, we don't have any chickens like that." And then the chicken actually turned out to be a rooster. It's an Americana and with that breed the roosters don't have big combs, so sometimes it's hard to tell. Well he went away because he was just upsetting everyone. Then another rooster of the same kind showed up in her bunch. He went away too. I didn't ask where they went. But it would seem there is another bunch of chickens in the neighborhood that are routinely escaping. No new chicks this year or ducks. We'll wait until next Spring. I think I have a good source for the little Call Ducks, so I'll get organized and be ready for babies in the Spring.

Our 20 are doing fine though. We do have a broody chicken right now. I've had this before and it's a strange event. A chicken will just decide that she wants to hatch an egg and she'll sit in the nesting box and not come out. Now our eggs aren't fertile, so she's going to be sitting there awhile. So the way I deal with it is to scoop her out of the box, while she's growling at me – yes chickens do growl – and shove her out the door to the outdoors with everyone else. It takes usually about a week for them to get out of that routine. She was right back in the box this morning, so today when I go home I'll shove her out the door again. Then it's the weekend and I'll actually really annoy her by continuing to boot her out. Interestingly, she never pecks me, just growls at me.

I spent about an hour with a 4-H group this week. I used to do more of these talks to kids, but haven't in awhile just because of schedules. But I enjoy it. This was a favor for a friend and there was a wide age range which makes it more of a challenge. The kids always ask the obvious questions – How often to do you get stung? How many bees are in that box? And one kid usually has a grandfather or an uncle that is a beekeeper. Will any of them grow up to be beekeepers because of something I said. Well, you never know. That's why we keep doing what we do.

It's almost the middle of June as I write this and we still don't have our garden in yet. It has been wet, wet, wet here. We have all the plants and Kim has resorted to putting a bunch of them in pots around the deck. So that may be our garden this year.

We had a pretty amazing Black Locust bloom here in Northeast Ohio. We had to put more boxes on all of our hives. Right now our bees are doing well. Beekeepers are pretty lucky here in Ohio. We have at least three very distinct honey flows. Kim calls them Holiday Honey Flows. Normally right around Memorial Day the Black Locust are kicking, 4th of July is Linden(Basswood) and Labor Day is Goldenrod. I know some areas have one honey flow and that's it. So we count our blessings here.

Bee Culture and many of us beekeepers lost a good friend in May. Bill Mondjack passed away after a not so long battle with cancer. We've known Bill for a long time. I'm sure I first met him while working with EAS. He was an EAS Master Beekeeper and a great promoter of that program. He and Kim would have some 'friendly' discussions about the Master Beekeeper Program. Bill worked for the Post Office for many years and served in Vietnam.

If you've been to very many bee meetings you may have run into Bill. He seemed to show up in lots of places. He lived in PA and would often make the trip to the big Tri-County meeting in Wooster, Ohio. So we got to see Bill pretty often. You couldn't miss him with that amazing long gray hair and equally impressive beard.

Bill had just recently started writing a column for our new publication – *BEEKeeping, Your First Three Years*. And, over the years we featured several *Bee Culture* covers with photos that Bill submitted. He was quite the photographer.

Kim and I have backed off of so much travel this year, hoping to get lots of things done around home and just not being on the road so much is nice for awhile. But we do have local things going on.

Bee Culture's Pollinator Day is July 21, right here in Medina at the A.I. Root Company. Our pollinator gardens are continuing to increase and improve. We have several groups that have plots they are managing. If you're passing through the area be sure and stop. And if you let us know in advance we might even be able to set up a tour of the candle factory with Kim as your guide.

And don't forget about October – our annual event. This will be our fifth, I think. We have John Miller, Ray Olivarez, Brett Adee and Mike Palmer coming in for two days in October to talk about how they got where they are today. Take a look on page 14 for all the details. We already have a good number of people signed up.

Hope to see you there. And I hope you're having a good Summer so far. Enjoy, it goes by so fast!

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A Healthy Colony Checklist

A Framework for Aggregating Hive Inspection

Introduction

One of the most critical tasks that beekeepers do is check on their hives. Knowing how the queen, brood, and other aspects of the hive are doing is critical to good hive management and long term colony performance. However, beekeepers seem to have their own individual lists of what to look for when they open up a hive, and few of them keep systematic records of what they find. Fewer still perform an analysis on which management practices worked for which problems identified in their inspections. And yet, Hive Inspection data has a tremendous amount of potential to improve beekeeping in general, and for the beekeepers that use it in particular.

In this article, we discuss why we need a framework for hive inspections and then present the *Healthy Colony Checklist* as both an easy-to-use framework and practical inspection checklist to consider. Next month we plan to continue this discussion by showing how we are testing and validating this framework, describing how you can find and use it and sharing how we see this evolving over time.

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Richard (Dick) Rogers is the manager of bee health research at the Bayer Bee Care Center

Ed Hassler is an Assistant Professor in Information Systems and Associate Director of CARE for Technology at Appalachian State University.

James Wilkes is the Founder and CEO of Hivetracks. and a Computer Science Professor at Appalachian State University. His lifelong passion for bees keeps fueling the development and mission of HiveTracks software. You can reach him at ***james@hivetracks.com.***

Why We Need a Framework for Hive Inspections

A framework can be defined as a:

Broad overview, outline, or skeleton of interlinked items which supports a particular approach to a specific objective, and serves as a guide that can be modified as required by adding or deleting items.[1]

As such, a framework is a way to help us think about things in a systematic, structured way, bringing different ideas together and linking them to each other in ways that can guide us towards a common objective. In this case, the common objective is to record information about hive inspections in a systematic manner that allows us to pool this information and learn from each other's hives to ultimately manage our bees better.

One example of a framework that is widely used is Game Theory. Originally developed in 1944 by John von Neumann and Oskar Morgenstern; it was extended by John Nash in the 1940s – which was the basis for his Nobel Prize – and has been used by researchers far afield from its economic origins. Today it serves as a framework of analysis in social research, sports (football), biology, and even artificial intelligence and machine learning. Another is Germ Theory which gave us a better understanding of the cause of diseases and led to widespread adoption of different health behaviors.

These frameworks allowed us to look at things in a different way by focusing us on what really mattered to the item studied, giving new insight to address old problems. While a hive inspection framework will not have the same type of scope as the ones listed above, it is a way to organize our thoughts, be more focused and efficient in our observations, and share data and insights in a scalable way.

[1] https://www.collinsdictionary.com/us/dictionary/english/framework

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While there are many things we should record, including hive genetics, treatments, performance, and migration patterns, the hive inspection is the primary way to see inside the hive and understand at a deep level what is happening. This information is critical for good hive management and allows for a proactive approach to giving bees what they need to thrive.

While eventually we will have sensors inside and outside of our hives to share this information with us, we are still figuring out how to make them practical and useful from a business perspective. There are also technical and reliability challenges making it difficult to make sensors affordable and useful in remote areas with limited signal and power availability, and this problem reduces the ability to collect good data. Eventually we will get there, but right now human hive inspections, coupled with good record keeping of management actions and outcomes, can move us a long way towards better beekeeping.

Having a widely adopted common framework for thinking about hive inspections, like the one shown in Figure 1, is one of the first and most important steps to standardizing our beekeeping data and a necessary step to building a **Genius Hive** as outlined in our article "**Peering into the Future: The Path to a Genius Hive**" in the April 2018 issue of *Bee Culture*.

Even before building the genius hive, there are many advantages to using a defined framework for hive inspections. These include:

- Inspection Focus, Efficiency, and Consistency
- Cognitive Complexity Reductions
- Temporal and Spatial Comparisons
- Data Pooling and Aggregation

We discuss each of these below.

Inspection Focus, Efficiency, and Consistency

Having a framework for thinking about a task, such as a hive inspection, increases efficiency in completing that task. By thinking through in advance what things are important to look for and which things are not, it focuses the mind on what really matters.

There are hundreds of things that can be looked for during a hive inspection. However, not all of them are equally important, and most of them are subdomains of a few things that really matter. As part of the process of testing the starting framework we are presenting below, our team collected and analyzed every hive inspection form to which we had access. This was helpful, but at the end of the day, it mostly boiled down to a few things to think about when opening your hive. By focusing on these few things, your inspections become more focused, efficient, and consistent across a variety of beekeeping contexts.

This efficiency lets you inspect more often with the same effort, trading the collection of less relevant details for more timely information about things that matter to make a difference to your bees.

Cognitive Complexity Reductions

Having a framework also lowers the cognitive complexity of doing an inspection, making it simpler for you to record consistent, accurate information in a systematic way. A framework can sharpen your observation skills, drawing your attention to the most important things to look for and shifting your mind to a more focused and receptive state.

Figure 2 shows a typical hive inspection form in electronic format. It has a lot of data and has its uses. However a more focused and efficient form would allow for more frequent and useful inspections, resulting in better bee outcomes by prioritizing the data collected.

Temporal and Spatial Comparisons

The efficiency and consistency advantage previously discussed poses another benefit: allowing for temporal (time) and spatial (distance or location) information. By having the information entered consistently over time, including by different people, that information can be compared to data from your past or that of other beekeepers and associated with hive outcomes based on various management actions or environmental conditions. This can help guide your operations to better performance. We expand on this idea in the next section.

Data Pooling and Aggregation

The diversity of data collected and applied from a broader group of beekeepers, coupled with the increase in data volume, can greatly accelerate our learning about what is best for our bees at different times and locations and in different environments. Properly collected, stored, aggregated, and analyzed, this data holds the key to unlocking the best management practices personalized to each hive given its own history, strengths and weaknesses.

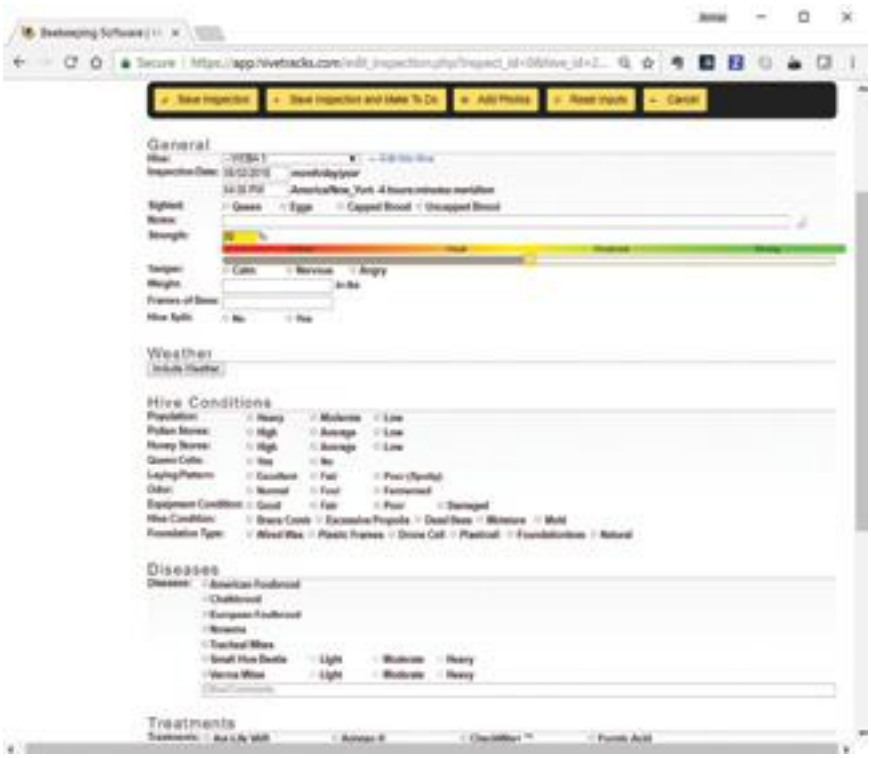
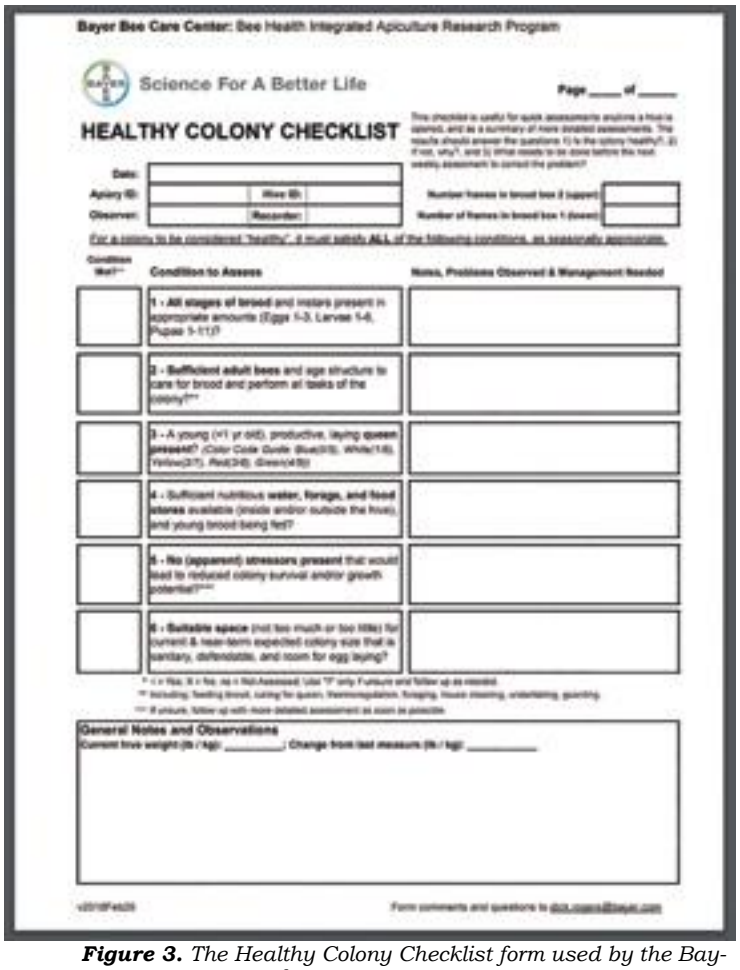


Figure 1. *An Electronic Hive Inspection Form.*



Bayer Bee Care Center: Bee Health Integrated Apiculture Research Program

Science For A Better Life

Page ____ of ____

HEALTHY COLONY CHECKLIST

Date:

Apiary ID: Hive ID:

Observer: Recorder:

Number frames in brood box 2 (upper):

Number of frames in brood box 1 (lower):

For a colony to be considered "healthy", it must satisfy ALL of the following conditions, as seasonally appropriate.

Condition Met*	Condition to Assess	Notes, Problems Observed & Management Needed
	1 - All stages of brood and instars present in appropriate amounts (Eggs 1-3, Larvae 1-6, Pupae 1-11)?	
	2 - Sufficient adult bees and age structure to care for brood and perform all tasks of the colony?**	
	3 - A young (<1 yr old), productive, laying queen present? (Color Code Guide: Blue(03), White(18), Yellow(37), Red(24), Green(45))	
	4 - Sufficient nutritious water, forage, and food stores available (inside and/or outside the hive), and young brood being fed?	
	5 - No (apparent) stressors present that would lead to reduced colony survival and/or growth potential?***	
	6 - Suitable space (not too much or too little) for current & near-term expected colony size that is sanitary, defendable, and room for egg laying?	

* = Yes, X = No, na = Not Assessed. Use "X" only if unsure and follow up as needed.

** Including: feeding brood, caring for queen, thermoregulation, foraging, house cleaning, undertaking, guarding.

*** If unsure, follow up with more detailed assessment as soon as possible.

General Notes and Observations

Current hive weight (lb / kg): _____; Change from last measure (lb / kg): _____

v2018Feb28

Form comments and questions to dick.rogers@bayer.com

Figure 3. *The Healthy Colony Checklist form used by the Bayer Bee Care Center.*[2]

In this next section, we present one candidate for you to think about as a possible common framework for performing hive inspections. This is the Healthy Colony Checklist created by Dick Rogers, Manager of Bee Health Research at Bayer, and released to the public domain for any beekeeper to use and adapt.

An Introduction to the Healthy Colony Checklist

What It Is

In addition to being a framework for thinking about hive health, the Healthy Colony Checklist is a one-page document, listing the six conditions that need to be satisfied for a honey bee colony to be considered healthy. The form is very simple to use, requires very little writing to complete, and is still able to capture the specific details needed to answer the three most important questions when you open a hive: 1) Is the colony healthy?; 2) If not, why?; and 3) What needs to be done to fix the problem?

Using knowledge and experience, beekeepers assess each condition and put a quick checkmark or X next to each of the six conditions to indicate if it is satisfactory or deficient. If a condition is deficient, then the beekeeper should determine what the deficiency is and what action is needed to fix the problem and then record this information in the box beside the condition. A colony can be considered apparently healthy if all six conditions are checked; however, if one or more conditions have deficiencies, follow up assessments or corrective actions are required.

That is all there is to it. Once the form is completed, there is no post-inspection processing, except to simply schedule when you are going to do the fixes or follow-up.

How It Came to Be

Dick Rogers is an entomologist who has been keeping and studying honey bees for 45 years. In the early years, he experienced the frustration of being overwhelmed by the complexity of the inner workings of a colony in a hive, and then later by the abundance of data that can quickly accumulate when collecting qualitative and quantitative data during bee health studies. Within the past decade, he realized that more frequent colony assessments were needed to detect problems early so they could be addressed quickly. Early detection is the best strategy for saving hives of honey bees from causes that might otherwise go undetected when inspections are infrequent. However, early attempts to come up with a fast, simple tool for capturing inspection observations were not effective or efficient in capturing the needed data for frequent inspections.

The practical determination of the health status of a honey bee colony can be achieved through careful inspection by a knowledgeable and experienced beekeeper. The path to a desirable system of colony assessment first required developing a definition of a healthy honey bee colony. The following simple definition is one Dick has used for many years.

A healthy honey bee colony has below threshold levels of parasites, pathogens, and predators; no deficiency of, or out of balance, beneficial microbes; and strength and health is sustainable with a reasonable amount of management by the beekeeper to provide food, shelter, and safety as needed, as for any livestock operation.

For practical use, the above definition was further expanded to identify six key assessable conditions that contribute to optimal colony growth potential and overall health. To be considered "apparently" healthy, for practical purposes, a colony must have, as seasonably appropriate, 1) all stages and instars of brood; 2) sufficient adult bees and age structure to care for brood and perform all the tasks of the colony; 3) a young productive laying queen; 4) sufficient nutritious forage and food stores; 5) no stressors that would lead to reduced colony survival and growth potential (including environmental conditions inside and outside hive, and issues with biosecurity and mingling); and 6) suitable hive space for current and near-term colony needs that is sanitary and defendable, and has room for egg laying and food storage.

Beekeepers have numerous ways of keeping records, from putting twigs or stones on the top of their hives to writing on hive covers and boxes, to making notes on their hands or on a piece of paper. On the opposite end of the spectrum are the records that researchers make to track colony health by looking at both sides of every frame, counting cells, and recording so much data that it takes hours of data entry and number-crunching to understand what the data are indicating – a process entirely too

[2]**https://beehealth.bayer.us/~/media/Bayer%20CropScience/Marketing/BeeHealth/Who%20Can%20Help/Beekeepers/Health%20Colony%20Checklist/Healthy%20Colony%20Checklist%20Form.ashx**

time-consuming for regular, routine monitoring.

The Healthy Colony Checklist, as shown in Figure 3, is a simple tool for those of you who are responsible for maintaining healthy honey bee colonies, so you can do more frequent hive inspections more quickly (<15 min per hive) with minimal writing. Also, the tool helps capture what specific management tasks are needed, and can be used to improve the assignment and scheduling of those tasks.

Any framework that is created and adopted will likely need to evolve over time and adapt to changing circumstances. Also, as more data comes in, we will be able to test the relative importance of various data elements to see what works well from a management standpoint. However, from our experience so far, this framework seems to be a good start at building something that can work for most beekeepers in most situations. No framework is perfect, but some are useful. Based on our early tests and evaluation, this framework for hive inspections seems to be a useful place to start for building a standard hive inspection process.

At the end of the day, what really matters is that we all do it the same way: we record key information and share the data and outcomes so we all learn how to be better beekeepers. Just as one could speak in English, Spanish or Chinese and understand each other as long as you were all speaking the same language, by having a common inspection process we can more quickly assess the health of a hive and share that information with others. This will lead to greater learning and understanding for all. Even though each language may have a few quirks, the fact that they are the same allows for efficient communication of information that can be pooled and analyzed to help us all be better beekeepers.

Next month we plan to explore this idea in more detail by discussing some of the ways we are testing and using this framework, and explaining how you can help or adopt it in your own operations.

Finally, special thanks to *Project Apis m.* for supporting a portion of this work with a Healthy Hives 2020 grant and to *Bee Culture* for providing a venue for sharing these ideas with an interested audience. BC

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A Closer LOOK

SWARMING BEHAVIOR

Clarence **Collison**

Seeley and Buhrman found that the scout bees in a swarm find potential nest sites in all directions and at distances of up to several kilometers.

Reproduction by colony fission, or swarming, is a spectacular example of a behavior that requires the simultaneous coordination of the activities of thousands of honey bee workers and their queen. The successful execution of this collective phenomenon relies on the appropriate response of individuals in swarms to a myriad of signals that are produced by workers and queens to synchronize their nest exodus, subsequent house hunting, and eventual relocation to a new nest site (Grozinger et al. 2014).

The time of year when natural swarming occurs in honey bees varies from one geographical region to another. Fell et al. (1977) completed a six-year study of natural swarming in the central New York (Ithaca) area (latitude 42° 27' N). The frost-free dates for the area are approximately 15 May-15 September. They found a bimodal distribution for date of swarm emergence, with a peak during the first two weeks in June and a lesser peak during the last week in August and the first week in September. The mean swarm size for 126 swarms was 1.53 kg (11,800 bees). The mean weight of 116 swarm queens was 195.9 mg; of mated queens 203.4 mg and of virgin queens 185.0 mg. Data from 1976 suggest that a virgin or a young mated queen may accompany a prime swarm.

During colony founding, a portion of a colony's workforce (the "swarm fraction") departs with the old mother queen in a swarm while the remaining workforce stays with a new daughter queen in the parental nest. There is little quantitative information about swarm fraction size and about how swarm fraction size affects the growth and survival of mother-queen and daughter-queen colonies. Rangel and Seeley (2012) measured (a) the swarm fraction in naturally fissioning honey bee colonies, (b) the growth and survival of mother-queen colonies as a function of swarm size, and (c) the growth and survival of mother-queen and daughter-queen colonies as a function of the swarm fraction. They found an average swarm fraction of 0.75. They also found a significant positive effect of swarm size and swarm fraction on the growth (i.e., comb built, brood produced, food stored and weight gained) and the survival of mother-queen colonies. They found no effect of swarm fraction on the survival of daughter-queen colonies. Evidently, a honey bee colony must devote a large majority of its workforce to a swarm so that the mother-queen colony can grow sufficiently rapidly to survive its first Winter.

The mechanisms used by a honey bee to organize the departure of a swarm from its nest remain a mystery. Rangel and Seeley (2008) examined the signals that trigger a swarm's explosive exodus from the parental nest, and they documented the concurrent changes in bee density and mobility. Using video recordings of swarms exiting observation hives, they analyzed how bees in three swarming colonies prepared for and then performed their sudden departures. Over the 60 minutes before swarm exodus, the production of piping signals gradually increased and ultimately peaked at the start of swarm departure. Also, during swarm exodus, bee density (number of bees in 100 cm^2) dropped markedly, whereas the average bee velocity (mm/s), and the production of buzz-run signals, spiked dramatically. Neither waggle runs nor shaking signals showed increases before or during swarm exodus. The explosive departure of a swarm from its parental nest shows how animals can use the same communication signals in different contexts; they now know that honey bees use piping and buzz-run signals to initiate both a swarm's departure from its nest and a swarm's take-off from its bivouac site (temporary encampment site usually without shelter). This study also shows how a small minority of individuals in a social insect colony can operate as an oligarchy to make an important decision, i.e. when a swarm should leave its nest to found a new colony.

After leaving the parental nest to start a new colony, a swarm of honey bees hangs from a tree branch in a beard-like cluster for several hours or several days while its scouts choose a suitable nesting cavity. In a bivouacked swarm of honey bees, most individuals are quiescent while

a small minority (the scouts) are active in choosing the swarm's future nest site. Seeley et al. (2003) explored the way in which the members of a swarm warm their flight muscles for take-off when the swarm eventually decamps. An infrared camera was used to measure the thoracic (flight muscle) temperatures of individual bees on the surface of a swarm cluster. These are generally the coolest bees in a swarm. The warming of the surface-layer bees occurred mainly in the last 10 minutes before take-off. By the time a take-off began, 100% of the bees had their flight muscles heated to at least 35ºC, which is sufficient to support rapid flight. Take-offs began only a few seconds after all the surface-layer bees had their flight muscles warmed to at least 35ºC, but exactly how take-offs are triggered remains a mystery.

Seeley and Buhrman (1999) studied the decision-making process of swarms in the selection of a new home site. They found that the scout bees in a swarm find potential nest sites in all directions and at distances of up to several kilometers. Initially, the scouts advertise a dozen or more sites with their dances on the swarm, but eventually they advertise just one site. Within about an hour of the appearance of unanimity among the dancers, the swarm lifts off to fly to the chosen site. There is a crescendo of dancing just before liftoff, and the chosen site is not necessarily the one that is first advertised on the swarm. Viewing the process at the individual level, they found the dances of individual scout bees tend to taper off and eventually cease, so that many dancers drop out each day. Some scout bees switch their allegiance from one site to another. The principal means of consensus building among the dancing bees is for bees that dance initially for a non-chosen site to cease their dancing altogether, not to switch their dancing to the chosen site. They hypothesized that scout bees are programmed to gradually quit dancing and that this reduces the possibility of the decision-making process coming to a standstill with groups of unyielding dancers deadlocked over two or more sites. A swarm's overall strategy of decision making is a "weighted additive strategy." This strategy is the most accurate but also the most demanding in terms of information processing, because it takes account of all of the information relevant to a decision problem. The swarms are able to use the weighted additive strategy by distributing among many bees both the task of evaluating the alternative sites and the task of identifying the best of these sites.

Seeley and Visscher (2003) considered the mystery of how the scout bees in a swarm know when they have completed their group decision making regarding the swarm's new nest site. More specifically, they investigated how the scouts sense when it is appropriate for them to begin producing the worker piping signals that stimulate their swarm-mates to prepare for the flight to their new home. They tested two hypotheses: "consensus sensing," the scouts noting when all the bees performing waggle dances are advertising just one site; and "quorum sensing," the scouts noting when one site is being visited by a sufficiently large number of scouts. Their test involved monitoring four swarms as they discovered, recruited to, and chose between two nest boxes, and their scouts started producing piping signals. They found that a consensus among the dancers was neither necessary nor sufficient for the start of worker piping, which indicates that the consensus sensing hypothesis is false. They also found that a buildup of 10-15 or more bees at one of the nest boxes was consistently associated with the start of worker piping, which indicates that the quorum sensing hypothesis may be true. In considering why the scout bees rely on reaching a quorum rather than a consensus as their cue of when to start preparing for liftoff, they suggest that quorum sensing may provide a better balance between accuracy and speed in decision making. In short, the bees appear to begin preparations for liftoff as soon as enough of the scout bees, but not all of them, have approved of one of the potential nest sites.

The identity of the scout bees in a swarm is determined by 1) which bees of the parental colony leave in the swarm, and 2) which bees of the swarm scout for nest sites. Gilley (1998) identified the nest-site scouts by comparing the age distributions of the parental colony, the foragers of the parental colony, the swarm and nest-site scouts in the swarm for four prime swarms and two afterswarms. Statistical differences were found between the age distributions of the swarm and the parental colony, the scouts and the swarm, and the scouts and the foragers. The median age of the swarm bees was lower than that of the colony bees, that of the scouts was higher than that of the swarm bees, and that of the scouts was slightly less than that of the foragers. These results suggest that the nest-site scouts are primarily middle-aged bees which have foraging or flight experience.

The function of the vibration signal during house hunting was investigated by removing vibrating bees from swarms and examining the effects on waggle dancing for nest sites, liftoff preparations and swarm movement. Donahoe et al. (2003) compared house hunting among three swarm types: (1) test swarms (from which vibrating bees were removed), (2) manipulated control (MC) swarms (from which randomly selected workers and some waggle dancers were removed), and (3) unmanipulated control (UC) swarms (from which no bees were removed). The removal of vibrating bees had pronounced effects on liftoff preparations and swarm movement. Compared to the

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MC and UC swarms, the test swarms had significantly greater liftoff-preparation periods, were more likely to abort liftoff attempts, and in some cases were unable to move to the chosen site after the swarm became airborne. However, the three swarm types did not differ in overall levels of waggle dance activity, the time required to achieve consensus for a nest site, the rate at which new waggle dancers were recruited for the chosen site, or the ability to maintain levels of worker piping necessary to prepare for flight. The removal of vibrating bees may therefore have altered liftoff behavior because of a direct effect on vibration signal activity. A primary function of the signal during house hunting may be to generate a level of activity in workers that enhances and coordinates responses to other signals that stimulate departure and movement to a new location.

Thousands of individuals in a house-hunting honey bee swarm make a collective decision for one among many nest sites discovered. Camazine et al. (1999) recorded the dances on swarms in a forested area, where one swarm's search encompassed about 150 km^2 and many different sites. They then analyzed swarms in a desert area with only nest sites that they provided and monitored, to study how the swarm winnows multiple finds to a single site over the course of a few days. Most bees did not visit any site; very few visited more than one. Apparently choices were made with little or no direct comparison, through the interaction of two mechanisms: positive feedback through recruitment leading to growth in the number of scouts visiting good nest sites, and attrition reducing activity and recruitment for non-chosen sites. Individual differences between bees substantially affected these dynamics. Scouts varied considerably in amount of dancing and persistence, but most that danced did so vigorously after their first few visits, and then dropped out, ceasing their dancing though continuing to visit the nest site. Dances were nearly twice as long as those reported for nectar and pollen. Scouts followed dances of others, and occasionally visited alternative sites, but rarely switched their dancing. When unanimity is reached, the bees must recognize that a decision has been made, break up the swarm cluster, and fly to the nest site. Buzz-running (Schwirrlaufen) probably plays a role here, but they observed less buzz-running than previously reported, and this occurred even early in the process; it might function as a chain-reaction effect triggering the end of the house-hunting process. Their results suggest that the choice among nest sites relies less on direct comparison of nest sites, and more on inherent processes of positive feedback and attrition by dancers dropping out.

Chemical signals influence the selection of potential nest cavities by reproductive swarms. Attractants for swarms include the odors of old dark brood combs, odors from non-comb hive materials and propolis and Nasonov pheromone, the odor released from the Nasonov glands of worker bees. Based on crossover and choice test experiments, swarms were shown to prefer, among otherwise identical cavities, those cavities containing Nasonov pheromone over cavities with only comb or other hive odors, cavities containing old comb over those with only non-comb odors or propolis, and cavities containing non-comb odors or propolis over those without bee or hive odor. Synergy between odors was not observed; that is, comb and /or noncomb hive odors did not enhance the attractiveness of Nasonov pheromone. These data support a model based on a hierarchy of olfactory attractants used by honey bee swarms, in order of highest to lowest: Nasonov pheromone, comb odor, non-comb and propolis odors, and finally, absence of bee-or hive-produced odor (Schmidt 2001).

Competition for nest sites is particularly strong when multiple groups of the same species migrate synchronously to found a new home. This may be the case for honey bees during the reproductive season, because neighboring colonies often cast swarms simultaneously, leading to potential competition for high-quality nesting cavities. To test the idea that honey bee swarms may compete for and defend potential nest sites as they search for a new home, Rangel et al. (2010) observed pairs of artificial swarms that were house-hunting concurrently. Workers from one swarm in each pair carried a gene influencing body color, so that the bees from the two swarms were easily distinguished. They set up a high-quality nest box and waited for nest-site scouts from each swarm to explore and recruit swarm mates to it. They recorded all the interactions between competing scouts at the nest box and found that when scouts from both swarms explored the box simultaneously they behaved agonistically toward bees from the other swarm. The level of aggression depended on the number of scouts from each swarm present at the nest box. When only one to three scouts from each swarm were at the box, they rarely fought. But when the scouts from one swarm outnumbered those from the other swarm (four to 20 versus one to three bees), those in the majority advertised their presence with a buzzing behavior at the entrance opening, and started mobbing and killing those in the minority. When one swarm gained clear control of the nest box (20+ versus zero to one bees), some of its scouts guarded the box's entrance, preventing entry by foreign scouts.

When a swarm lifts off to fly to a new nest site, only the scouts know in what direction the swarm must fly, and they constitute only about 5% of the bees in a swarm.

Nevertheless, a swarm will fly quickly and directly to its destination. How does the small minority of informed scouts indicate the swarm's flight direction to the large majority of uninformed bees? Two hypotheses have been suggested. The first proposes that the flying scouts streak through the swarm cloud in the direction of the goal, thereby indicating the travel direction visually (vision hypothesis). The second proposes that flying scouts release pheromones from their Nasanov glands at the front of the cloud of flying bees, thereby indicating the travel direction chemically (olfaction hypothesis). They tested both hypotheses by studying the flights of normal swarms and comparing them to the flights of swarms composed of bees whose Nasanov glands were sealed shut. Their results support the vision hypothesis and contradict the olfaction hypothesis. They identified fast-flying bees ('streakers') in swarms, as predicted by the vision hypothesis, but they found no effect of sealing the Nasanov glands of swarming bees. Sealed-bee swarms were perfectly capable of flying directly to a new nest site (Beekman et al. 2006).

Should a swarm emerge without a queen or its queen is unable to fly, the swarm soon returns to the parent colony. When the queen is taken from a swarm soon after it has settled, the bees usually become disturbed within 10-15 minutes and soon return to the old hive. Colonies deprived of hives and combs behave like swarms and were used in their experiments. When such a colony was allowed to cluster on a branch clamped in a retort stand and its queen was taken away, the worker bees soon became restless, running about on the surface of cluster, flying off and returning, apparently searching the immediate neighborhood for the queen. The disturbance increased until most of the bees were taking part in it, and eventually, unless the queen was put back, all the bees (except those too young to fly) joined other colonies (Simpson 1963). BC

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FOUND IN TRANSLATION

Bees, Beenomes, And Benefits From Science

Jay **Evans**, USDA Beltsville Bee Lab

Close your eyes and imagine a realm where you are seeing features of biology for the very first time, allowing you to piece together diverse insights you would never have dreamed of just moments before seeing them – insights and connections that change decades of scientific thinking. No, this is not a stroll through a tropical rain forest (though that sounds nice, too), but the first look scientists get when they sequence, assemble, and investigate an organism's genome. Honey bees faced this scrutiny a decade ago and the results continue to provide insights into not just honey bee biology but much of life as we know it. I described the methods and some driving forces for this effort in *Bee World* **(https://www.researchgate.net/publication/298550303_Beenome-mania_how_will_the_honey_bee_genome_project_help_beekeepers)** but the key paper describing the honey bee genome went public in the journal *Nature* in 2006 (**https://www.nature.com/articles/nature05260**). Scientists have cited this paper over 1000 times in the past decade and the bee genome has helped diverse scientific fields including animal behavior, insect development, and the study of how plants and animals follow a regular daily 'clock'. On the side of bee health, the genome highlighted the fortress of bee sociality alongside potential weaknesses in bee defenses toward disease and pesticides (redundant evidence to some).

Recent efforts to interrogate the honey bee genome have sped the development and maintenance of favored breeds and have had an impact on studies of bee stress, disease, and behavior. Some of this work was on display at this month's "Biology and Genomics of Social Insects" workshop at the historic Cold Spring Harbor Laboratories (CSHL) in New York. This meeting gave team members of the 'Beeomics' Consortium (**http://www.beeomics.ca/**) a chance to share results from their efforts to use genomic insights to identify desirable disease, overwintering, and behavioral traits. In preliminary work with markers developed early in their sequencing efforts, they showed a significant economic benefit gained when breeders used genome-based markers as part of their decision process (Miriam Bixby and colleagues at University of British Columbia and elsewhere, in the *Journal of Economic Entomology*, doi: 10.1093/jee/tox077). Marker-based efforts mesh well with the *Varroa* resistance breeding I discussed last month. Similarly, the Beeomics group is now finalizing a promising new genetic screen for Africanized bees, a key regulatory goal.

Two innovative genome studies described at the CSHL meeting involved measuring the distinctive traits of 'Winter' honey bees. First, Harshil Patel and members of Amro Zayed's group at York University, Toronto, introduced a collaborative project that has sequenced the genomes of 1000 honey bee samples from colonies across the U.S. and Canada. These colonies were otherwise unbothered, giving colony metrics for overwinter survival that can now be matched with specific sets of genes. Winter bees have been scrutinized in many ways, including work by another Canadian (coincidence?), Gard Otis, some years ago (**https://link.springer.com/article/10.1007/PL00001764**) but the source and traits of quality Winter bees remain hot questions. To that end, Tomas Erban and colleagues in the Czech Republic used a genome-enabled approach to show that winter bees carried an abundance of vitellogenin (a key protein in bees involved with everything from reproduction to resilience) and other proteins linked with nurse bees and bees having excellent nutrition (hal-01201309). In the most ambitious effort yet, work described at CSHL by Mehmet Doke, Tugrul Giray, and Christina Grozinger (Penn State Univ. and Univ. Puerto Rico) followed the expression levels of all active genes in the honey bee body as bees entered Winter. They compared these active genes with Summer foragers and nurse bees. The results led them to propose that Winter bees are in some ways a third worker form, one that takes the best of nurse bees (an over-active fat body in terms of proteins linked with on-demand energy) and foragers (an over-active set of wing muscle proteins, which they suggest make these Winter bees better able to keep the cluster warm in Winter). Neat stuff, and now testable in the field. Specifically, these markers can be used to vet the different ways used by beekeepers to prepare their bees for winter, perhaps changing established thinking on what we do to set up bees for their greatest challenge at the colony level.

As the usual disclaimer, gene-based approaches will not prove useful for all problems facing bees, and many beekeepers can and will get along just fine without these insights. Still, it can't be denied that this is a really exciting field of science, if only because it helps us better understand the strengths, weaknesses and novelties of an amazing insect. BC

A New Meaning For Bee School

Matt **Kristoffersen**

Class president. Marching band drum major. Engineering Club president. Lead singer in the school musical. Beekeeper. Can you spot the difference? The beekeeper may be accepted into Ivy League schools and other top universities at a much higher rate. As a smaller and smaller percentage of applicants are accepted each year, beekeeping continues to be an excellent way to set yourself apart from the hundreds of thousands of seniors in high school who apply to these highly selective universities.

Unlike the 20th century, simply having good grades and high scores on the SAT or ACT are just not enough to confidently expect a thick acceptance envelope from schools like Princeton, Yale, or Harvard come decision day, and being a part of a conventional extracurricular is rapidly following a similar fate. These days, with over 40,000 high-achieving students applying for under 2,000 seats at Stanford University alone, the average applicant has to be extraordinary to even think about applying. With such a high bar for admittance, Stanford and Harvard and other elite universities could easily fill their entire school with engineering nerds and do the same for band geeks – but why would they want to? While both definitely have a distinct place in these elite settings, high school students who do more out-of-the-ordinary activities can bring even more interesting ideas and experiences to these schools. That's where beekeepers come in.

According to several articles from admissions officers throughout the Ivy League and other top schools, an applicant who is heavily involved in an extracurricular like beekeeping shows passion, hard work, and a special connection with nature that many may lack. After all, to be invested in beekeeping does not just involve a two-hour practice or a short lunch meeting every other week. Hives require constant attention and care – missing a rehearsal for a band concert is a common occurrence, but leaving bees alone for even a week could spell disaster. The consequences of failure are also much larger: incorrectly preparing bees for a harsh winter can make many high school beekeepers backtrack on springtime promises for jarfuls of honey and have to dig into savings accounts to buy more queens in hopes of resurrecting dead hives. If a quarterback misses a throw, the cheerleaders still cheer and the game goes on.

Combining multiple academic disciplines is also something that colleges recognize. Applicants can be involved in mathematics competitions and science olympiads, but beekeeping combines this – and more – into a sort-of renaissance activity that top universities find a large amount of value in. Single-subject activities have a great place in the Ivy League, but there is something to be said for this combination.

Furthermore, the ability to solve problems in multiple academic dimensions is best seen in beekeeping. Do you need to find the best place to put a hive? Geography will help you. Want to influence the flavor of your honey in a natural way? Botany and plant biology will give you a good background for this. Meteorology is something that every beekeeper – high school student or not – should stay up-to-date with in order to be prepared for surprise floods or droughts that may happen throughout the year. All of these problems – and their solutions – easily transfer to college-level classes, where students with extensive backgrounds in natural processes can more adequately understand complex topics in classes like Organic Chemistry or Molecular Biology and can contribute interesting and diverse ideas to class discussions. Beekeeping adds practical, quantifiable experience that high test scores can not always show.

Spanish teacher at Redlands East Valley High School in Redlands, California, and avid beekeeper Michael Celano agrees: "Being a beekeeper shows college admissions officers that a student has the drive to succeed despite terrible odds: the fear of being stung [and] the tremendous disappointment of losing colonies

to mites, pesticides, and Colony Collapse Disorder [show] that the student is a well-rounded individual – that he or she doesn't just spend the whole day studying." Though they may not be common in high school due to expensive start-up costs and a high learning curve, students who choose to be amateur apiarists can find success both in the classroom and in the admissions room.

This is all evident in senior Alex Kristoffersen's college applications journey this year. "Admissions officers get tired of the same cliches in college essays," says the Redlands East Valley High School valedictorian, 'not to say writing about the classic topics won't work – a genuine essay will be fantastic no matter what the topic – but writing about beekeeping was a good way for me to express to the reader how I act on curiosity and overcome challenges. That being said, I didn't start beekeeping to fill my college application. I started because of honest interest, which made it easy to express that passion in my writing. Admissions officers can sniff out ill motive pretty easily, I think." In addition to balancing Advanced Placement classes, his work as a coach for the local swim team, and his responsibilities as the president of his school's engineering club, Alex has enjoyed beekeeping throughout his high school career.

"To be honest, I started solely for the honey. I still love the honey, but what keeps me still beekeeping is the constant challenge," he says. "In beekeeping, it's all about staying calm and going slow. It gets a little hard when there's hundreds of bees around your head. I love the challenge and the rush you get knowing that only a bit of fabric is protecting you from all that danger! Around two years into the hobby, I've gotten pretty good at reading the bees. Nothing too scary happens very often anymore, but things can still be pretty tense!"

Thanks to his investment in an unconventional activity, Alex will be attending the University of California at Berkeley and will study in the prestigious Electrical Engineering and Computer Science program – something that less than 10% of applicants can have the privilege of saying.

As Alex's college application journey shows, colleges are interested in keeping beekeeping alive in the younger generations – especially in the face of major environmental issues like Colony Collapse Disorder and climate change. In addition to recruiting beekeepers, top-level universities can also foster an interest in beekeeping by way of their endowment. Harvey Mudd College, the 12th best national liberal arts college in the United States according to USNews.com and the second best college in the nation for return on investment according to Payscale's 2017 College ROI Report, even has its very own Bee Lab. Through senior theses, research publications and captivating experiments, the Bee Lab introduces new students to the world of bees and provides an almost limitless sandbox for seasoned veterans and lovers of honey alike. This is far from unique: dozens of universities across the continent have entire departments dedicated to apiculture and insect behavior, from Montana State University to New Mexico State University to the University of California at Davis. The University of California at Berkeley has an Urban Bee Lab which Alex looks forward to working with. "When I toured last year, I made note that bees would be perfect there, so I can't wait to check that out," he says. "Besides the bees, I'm super excited for everything Berkeley has to offer me as a student of the College of Engineering. They have a maker-space called the Jacobs Institute that I can't wait to dump some serious time there."

As for when Alex moves away, "I haven't decided yet. I'm hoping that if I set them up well enough during the Summer, my hives will be healthy be the time I'm back for vacation. But who knows, maybe I could give them to another student who wants to get into beekeeping too!" For the next group of high school students who hope for a similar outcome in regards to the college admissions process, Alex's absence leaves a wide open opportunity to become amateur beekeepers and improve their college admissions chances in the process.

However, as much as beekeeping may help convince colleges to accept you, hard classes, good grades, and high standardized test scores are still absolutely necessary to be competitive in the admissions process. Just like being a stellar trumpet player or the captain of a nationally ranked volleyball team cannot fully make up for an F in AP Chemistry or an extremely low score on the ACT, simply being a beekeeper cannot guarantee you a spot at your Ivy League school of choice. Such an extracurricular should be a complement to an already accomplished and interesting resume. While just grades and standardized test scores sufficed in the 70s and 80s, they are now just a way to see if applicants can succeed at a certain university, and not if they deserve to go. In a more bee-friendly way, those two things are the frames in a beehive; the honey is the extracurricular achievement.

All in all, if high school beekeepers are academically talented and write good essays, the results can be very gratifying. With hard work, beekeeping can bring two amazing gifts next Fall: tons of delicious honey and plenty of acceptance letters! BC

IPM Research At The University Of British Columbia

Shelley **Tomlinson**

Biologists, beekeepers and economists are all working together at the University of British Columbia (UBC) to help beekeepers deal with challenges being faced by the industry.

Leonard Foster, a professor at the Michael Smith Laboratories at UBC in Vancouver, Canada, is studying integrated pest management of honey bees.

"My research into honey bees focuses on understanding how bees are able to resist disease and then using that knowledge to try to provide tools to beekeepers that will allow them to select for bees that are disease resistant. An important consideration there is that we are not trying to genetically modify the bees to make them disease resistant. In part because the technology doesn't really work for bees so we don't know how to do that anyway," said Foster.

"Instead, we're trying to understand how the bees are able to resist disease and then amongst the natural variation within the bee population be most disease resistant."

Its important research for the nearly 10,000 beekeepers in Canada. According to the Agriculture and Agri-Food Canada, there were 9,859 beekeepers across Canada in 2016 including 2,640 in B.C. alone.

There are also over 750,000 colonies across Canada, of which there were 39,885 colonies in B.C. Honey bees produce about 75 million pounds of honey in Canada annually.

According to information on the Foster Lab website, beekeepers in North America have lost about a third or more of their bees every year which is roughly three times the historical average. The project the lab is working on is trying to reverse the trend of colony losses by creating new integrated pest management tools and creating recommendations for the honey bee industry.

There are several tools and recommendations being created including protein markers to help with the selection of honey bee stocks that have natural disease resistance.

Another is "RNAi-based treatments for bee diseases" and a third is a best practices guidelines for integrated pest management.

"The obvious way is to let the bees go and have diseases and the ones that survive are going to be the ones that are disease resistant but that doesn't work for a few reasons," said Foster.

"One is beekeepers need bees year over year in order to run their business and the number of bees you would need to run that sort of natural selection process would be enormous and it's not just feasible and there are also other considerations as to whether bees survive or not such as how harsh the Winter is and what type of predators might affect those bees," he continued.

"Instead, what we do, in parallel, we observe bees performing disease resistant behavior. So we can challenge a bee colony with a particular pest or pathogen and then measure directly how they came towards that pest and then at the same time, we are measuring a molecular fingerprint of those bees and the bees that are disease resistant, we're looking in those molecular fingerprints for aspects of the fingerprint that are unique to the bees that are disease resistant. If we find those unique signature for disease resistant bees then we can use that information to guide a selective breeding program where we look at hundreds or thousands of different bee colonies and measure their molecular signature and those that have a fingerprint that is similar to the disease resistant fingerprint that we measured are those bees that are likely to be disease resistant and then we can decide that those are the bees that we want to selective breed."

Losses in colonies are attributable to a variety of factors including bee specific infectious diseases.

Although some diseases can be controlled using chemical pesticides, "many of the bacteria, viruses, fungi and mites responsible are becoming resistant."

According to information about the Foster lab, "as consumers become more aware of what we eat, chemical residues in honey and bee pollinated crops are less accepted. Integrated pest management is the combination of a variety of approaches to control and manage agricultural pests and diseases; it can include biological, physical and chemical controls."

According to Foster, another issue for bees and beekeepers is the way that bees producer.

"Another complication here for bees and beekeepers is that it's not like cows or sheep where you can put a male and a female in a pen together and get them to mate. Bees have to mate naturally in the air, usually away from where the hives are and one Queen Bee will mate with usually 15 to 20 male or drone bees. So, in order to control that, you need to make sure that all the drones that your Queen might encounter are also from disease resistant colonies. One of the tricks that we've had to use is called a closed mating system where we go to Bowen Island and by being able to control all the bee colonies that are on the island, we can allow the Queens that we want to mate with the drones that we want."

Ian Kennard is one of the beekeepers from Bowen Island that was involved in the study.

"About 2014 at the BC Honey producers AGM, Leonard had announced that they had come to the end of the research project for the protein marker selected research and they wanted to work with bee breeders that would be interested in going through the process of having their bees tested," said Kennard.

He and another beekeeper suggested Bowen Island as a site for the research.

"(Bowen Island is) fairly close to the city (of Vancouver), fairly isolated in terms of we don't have to worry about bees flying over to Bowen Island," Kennard said.

Heather Higo was the project field manager for Bowen Island.

"They (the two Bowen Island beekeepers) have both worked with other beekeepers over there and helped coordinate that with us so that we can control to a great extent the population of drones on Bowen Island so that when we do isolated readings over there its with the desired mating stock that we want our Queens to mate with," said Higo.

"We've been following Leonards research for a number of years. They were getting fairly close to being able to test bees from breeding stock and we had been following it because we felt this was a good way to improve our stock by having it tested for hygienic behavior," said Kennard.

"At that time we were just looking at hygienic behavior. When they announced they wanted to do this, we jumped on board and offered to set up the nucleus colonies. They went around testing the drones and the Queens from other colonies around the Lower Mainland and other parts of the province. They would bring those over to Bowen Island and we would do the breeding it," Kennard continued.

"So it was a three year project. They got funding for a three year project. That came to an end last Summer. We're still waiting to see what's going to happen going forward here. I think we're speaking with Leonard near the end of January. He's coming over to speak to the BOwen Island municipality as to what we've been doing here on the island for the last three years here. We're hoping that some other aspect is going to go forward."

Higo stated that the project went really well.

"(We've) seen progressively hygienic in the Queens and offspring that we are producing. Its gone very well. Our methodology has improved a little but every year as well because we've learned from our mistakes," she said.

For Kennard, working with the scientists was an eye opening experience in terms of the amount of protocol they have to follow.

"We had to do things I normally wouldn't do but I see the reasons some of the stuff they have to follow like clipping the Queens wings and stuff like that, especially the project Queens so they don't fly off into the natural environment, have control over where they go," he said.

Foster is also co-leading a project titled BeeOMICS. Its aim is to develop protein biomarkers that will allow selective breeding honeybees for 12 economically valuable traits.

It will benefit beekeepers by gaining tools to select improved colonies that are pest free, disease resistant and produce more honey. BC

BIGGER PICTURE

Jessica **Louque**

Making A Family Business

My oldest son Henry is a senior this year. A good portion of this particular paragraph (and also maybe a couple others) will be shameless bragging, but I promise there's a point to it (somewhere, I think). He was offered a position on the Mars Hill University soccer team as a goalkeeper – with possibility of being a starter. Mars Hill also gave him an academic scholarship for a large chunk of the tuition cost. By the time this article is published for you guys, my baby will have graduated and started his Summer job – at Louque Ag. He'll be able to start this Summer as a Technician II since he'll have a high school diploma.

When we started our company, part of it was to be able to do our research with more control over the costs, supplies, and overall study conduct. A larger part was to have a family business that would include our kids and give them something for their futures. Henry will be the first of the four in this crash course of running a business. As Bobby and I have scientific backgrounds, our knowledge of business is based on my experience with my real estate license and the help of our CPA and attorney. Usually plans don't work the way you expect when they're plans for other people, but I have at least the next seven years of Henry's life totally worked out (in my mind) even if he doesn't.

Henry at Mars Hill soccer tryouts.

His university offers a Bachelor's in Business and they have an MBA program that picks up right after graduation. I'm thinking that he can play soccer to keep him on the right path for good grades and not getting in too much trouble, and then he can go into grad school and maybe help as an assistant coach on the soccer team. Once he graduates with an MBA (and maybe his undergrad minor is biology), he'll have a good six additional Summers of experience with us in the field and should be able to come into the company with a lot of ideas and insight on the business side.

There are a lot of different backgrounds that can come into play when you own a company, but the scientific research community is already fairly diverse. We have enough options that even though we don't necessarily know what area our kids will choose for their focus, we'll be able to work it into a job description. Besides the obvious area of the biology field, there's a lot more that can go into the field work or the overall study conduct. A large portion of our research is writing. We have to write protocols that follow a specific format based on the sponsor's preference, final reports that are any where from a couple hundred to a couple thousand pages, data summaries, abstracts and report summaries, field notes, emails to sponsors, emails to government entities – the list goes on and on. A good literary or English background could be beneficial to a report writing position.

A lot of math goes into the job as well. All of our data has to be analyzed on multiple levels, usually with a statistical program. Every single study we do has some sort of calculations for application and calibrations, as well as verifications. We have to calculate how much to spray based on how much active ingredient we're using, if it's in a formulated product (and if so, how much percentage is active ingredient), how many gallons per acre we need to use with our sprayer, what sort of coverage we need, what area is being sprayed, what rate should be used, etc. The sprayer has to be calibrated as well and then we calculate a pastime rate based on the application calculations and what output is needed. A degree in stats or biostats or something math-like (one of my least favorite areas) could be a lifesaver in this area, especially in all the times I can't figure out why my stats won't run correctly. This could also go into data entry and making sure everything is correctly digitized.

For most colony health studies, continuous assessments are made on each colony. Bobby and I often do visual assessments on colonies. These Colony Condition Assessments (CCAs) are a way of gauging the changes within a colony over a period of time. We look at a frame and estimate the percent coverage on a frame of bees front and back (in increments of 5%), then we look inside the cells and do the same estimates for coverage of eggs, open brood, capped brood, honey, nectar, pollen, and empty cells. We make a note if we see any signs of disease, if the queen is marked (or not), if we see queen cells, or if anything looks aberrant. Our frames are plastic because they hold up to the abuse a lot better than wooden frames, but also because they are much more consistent with 3,936 cells per frame side on every frame. Some of

the inserts that are used in wooden frames are meant to be consistent, but easily get cut in the wrong place or lose an entire row's worth of cells. By our base calculations, a frame that had 100% coverage of bees would have 1,394 bees per side for a total of 27,870 adult bees in a 10-frame deep super as the maximum number. Keep in mind this does not account for foragers or bees on the super walls, but simply the bees found on the frame itself.

It can be a tedious task and requires each of us to have a writer that uses a specific form to record all the numbers we call and be able to do the math to catch us if we total over 100% unintentionally (sometimes there can be more than 100%, like if the bees are so thick they beard off the frame or burr comb full of drone brood lines the bottom). Because of the intensity of these assessments, it can take over an hour for a triple or quad hive. It's fairly difficult to complete more than 14 hives in a day per observer, depending on the size of the colony.

Just the opening, taking apart and putting together, and then closing back the hive can take a good 10 minutes sometimes. If the study is too large, we have to use digital photography for these assessments. In these cases, we usually only record numbers for the adult bees, capped brood, and pollen. In some studies, we only do brood assessments to see if there is an effect on the survival from egg to adulthood, but the process itself can be detrimental to the health of the larvae – which is why we have colonies that are not exposed to anything so we can see what stress is caused just from doing the assessment.

In these, we photograph a frame full of eggs and "mark" 300 of them on a program. We take photos of that same frame multiple times throughout the brood cycle and then see how many of those original 300 eggs survive to adulthood. A good background in photography or computers can be absolutely invaluable in these assessments just to expedite the assessment timing and make sure we don't have photo retakes because they were photographed on incorrect settings or the program can't analyze the photo.

Agriculture also plays a large role in what we do. We have to grow crops in different climates all over the country and be able to understand basic physiology of each crop and how it might change in various environments. Sometimes we can lose an entire sample just from a setback of a few hours, making time a valuable commodity.

Charlie and Henry helping install bees.

If we do a large tunnel or field study, we have to have a pretty good idea of when we can expect bloom time from the planting date and germination date. Irrigation, fertilizer regimes, soil conditions, and field equipment are also expected for an agriculture background. We have to be able to have the equipment we need and know ahead of time that it will be useful. If we have a tractor or irrigation equipment, we have to know how to maintain or repair it and store it for the winter.

From the business perspective, we have a ton of HR/Admin paperwork on a constant basis that needs to have a lot more attention than it currently gets. Just keeping up with paying taxes, filing receipts and purchases, paying bills, and general maintenance is a full-time chore. Marketing also has a large part in our work, which could fall into a business development perspective or a design background. There's also the general business operations. Although Bobby and I currently own and run the business, a CEO with a business degree would be quite useful in managing our company in the long run (HENRY).

It would be great to have all four of our kids come back and work with us and be able to take the business to a profitable future for each of their respective families. No matter what they choose for a career path, I think I have it covered somewhere in Louque Ag, or can make it into one. For now, Henry's the first up in the limelight to be able to be successful in college and hopefully come home and be the first Louque Ag second generation to be a permanent employee. I think he can set a good example for his siblings and maybe we'll get them all in the business by the time George graduates college! BC

Jessica Louque and her husband, Bobby run Louque Agricultural Enterprises, a contract research business specializing in apicultural studies. They're also raising kids, poultry and bees in NC.

Hard Times For Tupelo Honey

Elisabeth **Doehring**

Deep into Gulf County an echo fills the trees and riverbank. A flash of black darts streak across the air. Bullseye! The aviator strikes on a fresh snow-white blossom. As she shifts along the perimeter of the green ball, measuring the size of a BB, the honey bee extracts nectar.

Filled with elixir, the fieldworker flies her heart out back to the hive with a GPS that rivals drone aircraft. The deposit is liquid gold – one that is revered and sought out by honey connoisseurs worldwide.

Water Wars

A stone's throw from Apalachicola's Gibson Inn, Dan Tonsmeire launches his Whiteline boat from Ten Foot Hole into the Apalachicola River with a Florida State University film crew on board.

Tonsmeire, the riverkeeper, provides a running "Waterway 101" brief as he navigates. After the U.S. Army Corps of Engineers completed the last of five federal dams in Georgia in 1975, increasing stress caused by 10 privately-funded dams already in operation along the Chattahoochee and Flint Rivers, water flow diminished, and the Apalachicola River began fighting for its survival.

Manmade dams started to further manipulate water flow in response to Metro Atlanta's frenzied buildup and expanding agricultural interests in southwest Georgia. Operations in Georgia were further tweaked in 1983, which held back additional water resources to the rivers, and dried up the floodplain even more along the Apalachicola River Basin.

As the Whiteline passes Brothers River, a tributary of the Apalachicola, tupelo blooms are spread out as far as the eye can see off the starboard side. Tonsmeire explains, "Wewa southward to Sumatra is the motherlode

of the world's white Ogeechee tupelo." While it has many imitators, the only certified tupelo honey in the world – arguably the finest honey in the world – is produced in this area of the Florida Apalachicola River Basin, thanks to the Ogeechee tupelo.

Numbers from the 2006 U.S. Geological Survey (USGS) Report, "Water-Level Decline in the Apalachicola River Florida from 1954 to 2004 and Effects on Floodplain Habitats," are compelling to the Florida-Georgia showdown. Citing this report Tonsmeire says, "We've lost 3.7 million white Ogeechee tupelo trees from reduction in water flow to our floodplain. This is a serious issue that has been going on for 30 years. Yet, Georgia has wanted to put its hands over its eyes and pretend that this water crisis never existed."

According to the U.S. Geological Survey Scientific Investigations Report 2008-5062 "Drier Forest Composition Associated With Hydrologic Change in the Apalachicola River Floodplain, Florida", by Melanie R. Darst and Helen M. Light, from 1976 to 2004, "Ogeechee tupelo, the species valuable to the tupelo honey industry, has declined in number of trees by at least 44 percent."

Water is the lifeblood of the Apalachicola River Basin. "It is the driver for the productivity of the river, the flood plain, the bay, and the eastern Gulf," says Tonsmeire. "Beekeepers in this area are hanging on because they love what that they're doing. It's a tradition. One that they know and love. Yet, like the oyster harvesters, they see it disappearing before their eyes."

Tonsmeire notes that small operator stands once vibrant around Apalachicola, Bristol, Blountstown, Carrabelle, Eastport, and Wewahitchka just 10 years ago have all disappeared. "Now the imposters are showing up. If the honey crystalizes, you ain't got the real stuff!"

True tupelo has a 16 to 18 percent moisture level. Always raw, it also contains the sugar levulose. The presence of levulose and a lower moisture level ensure that tupelo does not crystalize. This non-crystallization, combined with a smooth and rich taste, make tupelo the Rolls Royce of American honeys.

A Disappearing Way Of Life

In 1923, Austrian scientist Rudolf Steiner predicted that in 80 to 100 years honey bees would collapse from the face of the earth. His prediction, based on the use of chemical and artificial fertilizers, seem true with Colony Collapse Disorder (CCD) – an occurrence in which bees are now disappearing in mass numbers from hives with no clear explanation. CCD and the lack of water flow threaten not only one of the world's most sacred resources – white Ogeechee tupelo honey – but a way of life for a small Florida town.

Supplies of tupelo honey in the Apalachicola River Basin are dramatically down, and harvest numbers began dropping about five years ago – around the same time the legal fight began over water rights.

Buddy Parker is a third generation Gulf County beekeeper. As a boy, he watched as his father and other locals stood for hours harvesting honey from eight-and 10-foot scaffolds in the 1960s. Springtime was a tupelo rite of passage along the water's edge.

A good year's harvest with Buddy's father and grandfather yielded an average of 100 pounds per hive. Today, Parker reports a five-year yield of 27 pounds per hive. Parker brought in 42,000 pounds of tupelo in 2016, compared to last year's yield of only 455 pounds.

Beekeepers at work in the 1960s. (photo, FL State Archives)

In addition to lower yields, today Parker and locals watch outsiders increasingly tread on sacred tupelo territory. Parker swats dirt from his veil, splattered with specks of beeswax, "Back in the day beekeepers respected the two-mile limit. Now we got more beekeepers than you can shake a stick at!"

Seven or eight years ago, George Watkins was riding a tupelo high. The 25-year veteran and second-generation Apalachicola beekeeper was featured in Garden & Gun and highlighted on the PBS series America's Heartland and Culinary Travels with Dave Eckert.

Harvesting prime virgin terrain along Forbes Island, the apiarist supplied the local Piggly Wiggly grocery store with 2,500 pounds of tupelo a year. Customer call-ins numbered in the thousands, and requests for his honey were fulfilled as far away as Europe and Central America. Decades earlier, Watkins had worked as a consultant for the tupelo industry movie Ulee's Gold.

That was then. This is now. "In a quarter century I would not believe what I'm seeing today," says Watkins. "The trend started five years ago. We're on a downhill slide. The trees are not producing. About the same time that the oysters began vanishing, the tupelo starting dropping below accepted levels."

What Watkins once called "honey in the bank" is now becoming a hardship for beekeepers. GMOs, manmade chemicals, and demand for cheaper and faster farm produce are reasons cited by Watkins. "Pesticides and GMOs are what the French are blaming it on, too," he says.

Colony collapse is a significant factor. International studies indicate that there may be a link between radiation from cell phones and towers that are contributing to CCD, and Watkins is a proponent of the theory. "I've seen a strong hive disappear within a month. Cell phones are a multi-billion dollar industry. Nobody can live today without computers and cell towers," he says.

The liquid gold alchemist says with a drop in his voice, "This whole occurrence might be man-made and it might be too late."

Festival of the bees

The third Saturday in May, the town of Wewahitchka, known as "Wewa" swells from just under 2,000 to more than 6,000 people. Now in its fifth decade, the Tupelo Honey Festival is the South's celebration of all things honey.

Lake Alice forms an Old Florida backdrop. Spanish moss hangs down like sticky strands of drizzled honey.

Truck drivers, nurses, and lawyers stop by to sample the new yields. Among the crowd are Ingrid Courtney, a nurse originally from Montreal, now living in nearby Panama City, and Harry Haldeman. Both tout the health benefits of tupelo.

Beekeeper Jeremy Miles, who is employed as a lineman, projects his voice over the noise of the crowd. "Outsiders are takin' over," says Miles with a frown. From 2009 to 2014 Miles brought in a yearly average of six drums of tupelo. The 2016 harvest yielded zero. In 2017, Cypress Creek Apiaries did not produce a single drum. "What can we do? We're just broke beekeepers," he says squinting in the sun.

Harvest time and a future of uncertainty

The last two to three weeks in April are tupelo time. Beekeepers never return calls. The world shuts down – their only universe is the female honeybee and America's most aromatic blossom.

"We beekeepers are on it!" says Buddy Parker. The minute white tupelo blooms, hives are stripped of other honey. This ensures that the new crop is as pure as possible. Timing is critical to producing the best tupelo.

Within these same rivers and swamps of the largest tupelo forest in the world beekeepers map out spots for this spring's harvest. As they seek out prized tupelo blossoms, Parker and other beekeepers hope to make this season a hymn to the honey bee.

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Off The Map Expeditions
www.offthemapexpeditions.com

The Honey Industry's Come Back Kid

Andrew **Vahradian**

Mead. Something you've probably heard of in your travels and workings as a beekeeper, or casual enthusiast that's just here for the ride.

The alcoholic refreshment that historically has been three parts water to one part honey. Simple. Perfect. Alcohol from honey. Delicious.

As the world's oldest fermented beverage, mead has seen everything from the commencement of farming in the Neolithic age, to the first forgings of bronze, copper and iron tools, the establishment of civilization's first democratic society in Athens, to every season of the never-ending revolving door that is the reality television series, *The Real Housewives*.

Not only is it the eldest form of booze, mead is also the most broad and diverse of any of the alcohol categories. It can be on the sweeter side, or bone-dry. It can be still, or carbonated. It boasts an ABV range of 2% to 60%. There are more than 400,000 species of flowering plants on our planet that we know of, which conceivably, means there are that many varietals of honey, all with their own unique tastes, colors, aromas and textures. The total combined number of grapes, malt grains, apples and rices don't even come close to 400,000. Additionally, as honey is such a malleable flavor, it provides a remarkable foundation for creativity. The assortment of produce and spices that can be combined into a mead are practically endless. As such, mead makes for a great food pairing, and a terrific mixer for cocktails and even beer.

Traditional style mead tends to be still (non-carbonated), with an ABV in or around 12-14%. Session or draft style, tend to be carbonated, have an ABV more in the range of 6-9%, and are lighter and crisper.

So, for such an interesting and storied history as mead has, you're probably thinking now (right now!),

"well, where is it? I've never really seen it around before, let alone had it at a bar or restaurant."

This is changing.

Over the last decade, the number of mead makers has, for lack of a better term, skyrocketed. In 2003, there were approximately only 30 producers. Today, the industry is pushing 500, much like those twins on the motorbikes. Every state except for Nevada has at least one meadery, including Washington DC and Puerto Rico. Although, rumor has it one is set to open in Nevada soon. According to the American Mead Makers Association, a new meadery opens up every three days in the United States, and every seven days for the rest of the world. Over the 2015 fiscal year, industry sales increased 85%.

Business is a boomin'. Relatively. And with such expansion, a wave of creativity and novel mead making techniques has begun to germinate. Newer producers are pushing the bounds of people's conception of what mead is, and what it can be. They are dropping jaws and leaving the preconceived perceptions and negative notions (alliteration - nice!) in the dust. For example, there are a number of producers now serving mead in cans, a concept that didn't exist only five years ago.

However, while this rowdy bunch is inaugurating a coup d'état within the craft beverage market, mead is still largely unknown to the vast majority of drinkers and

general population. And while a higher percentage of beekeepers, and people involved with the beekeeping community have heard of mead, a lot have not had the opportunity to learn more about it.

While producers are doing all they can to get the word out about mead, an important piece of the puzzle is missing: distribution. A key influence and significant force behind the alcoholic beverages that get poured into your glass. To date, mead has largely been overlooked by the distribution tier of this country's three-tier system. I think it has something to do with distributors not wanting to put in the additional

effort or legwork required to bring retail clients and consumers up to speed. Products need to sell sell sell! Quick quick quick! As such, the distribution channels that are available to breweries, wineries and cideries, are not available to meaderies. One of the main reasons behind why we're inundated with more IPAs and Chardonnays than you can shake a stick at. We get it – hops! We know – white wine! With mead, the soul is there. We're just missing the gospel choir.

Enter Mutiny Distribution

Comprised of a handful of freedom fighters just as unruly and mutinous as the name would suggest about the country's drinking norms, Mutiny Distribution is the world's first distribution company that focuses exclusively on session and traditional style meads.

Based in New York City, Mutiny Distribution aims to bring mead to the masses. Make the drink once reserved only for royalty, more accessible, and approachable to a wider audience.

In order to develop Mutiny, I needed to visit mead makers. Lots of them. Therefore, I spent four months traveling across every region of the good ole' U.S. of A doing just that. At the end of my meandering, I had met with, and spoken to, more than 50 meaderies. The stories I heard were incredibly inspiring. People working three jobs in some cases to finance their dream of starting a meadery. The passion in the voices. The determination in the eyes. The science behind the tanks. I must say, I was so immensely humbled by the level and caliber of producers I got to meet, and the ones that Mutiny is partnering with.

One of the topics that was always front and center in these meetings, was honey. I pulled a fast one on you there, I know. I apologize! The varietals used, the difficulties of working with one type to another, the proximity of the floral sources to the meadery, the remoteness of the meadows or forests the bees would pull from, or the grade of the farm and crops if the honey was not produced from wild spaces. These aspects are central to most meads, and accordingly, mead makers handle these decisions with care.

I classify meaderies into three camps: ones that cultivate honey from their own hives and land, ones that work with local apiarists, and lastly, ones that source their honey from larger-scale enterprises like Dutch Gold. From the data I collected, I estimate that approximately 5% or less of mead makers produce their own honey, roughly 15% utilize larger-scale enterprises, and a whopping 80% work with local beekeepers.

Like with any artisan, quality is paramount, and the mead community has shown they overwhelmingly trust local beekeepers to provide them with that eminence. Mead makers tend to not only go hyperlocal with their honey, but for the produce they utilize as well, normally sourcing from sustainable farmers all within a few hundred miles of their facilities.

Mead will be the next area of craft alcohol. There is too much talent and quality out there for it not to be. It is only a matter of time. Consequently, mead is the yellow brick road for beekeepers into a

new and large industry, the alcohol industry. Sure, there have been other avenues leading there over the years, like Jack Daniel's Tennessee Honey, but nothing has been more clean-cut or unequivocal. Mead is an untapped alcohol category that has the legs to grow in a meaningful way. And with that, can expand a regional beekeeper's footprint and the consumers their products can reach, and critically, swell their business' bottom-line.

Not only does mead offer beekeepers a means for reinvestment, or a path to that new showerhead you've been eyeing, but it enlarges their pool of customers with people and businesses that are passionate about the things beekeepers (and the farmers they may work with) hold near and dear to their hearts.

Like beekeepers, the mead community is built on the same core principles of supporting local farmers, preserving natural environments and farmland, and promoting the health and well-being of bee colonies across the U.S. Mead makers understand and care about reducing the use and spread of pesticides, honey imports cut with cheap syrup fillers, and the challenges facing apiarists like shorter Springs and longer Winters brought about by climate change. This community appreciates the fact that mead can be the instrument in which the alcohol industry can have a more positive impact on the environment. The idea that when a person reaches for a bottle of mead over beer, cider or wine, that choice can directly contribute to reversing the effects of such issues like colony and habitat loss, and promotes more sustainability within the food production chain.

Ever since I was very young, I have loved being in nature and exploring the world's wildernesses. I care greatly about the environment and our impact on it, and this ties into one of my favorite characteristics of mead and the community behind it.

Let's get down to brass tacks. Do some of these details sound romanticized? Sure. Is every single meadery going to agree with what I've said. No. Do I sound a bit like a boy scout towards the end? Probably. But the commentary outlined above is based on facts.

Mead has the potential to be so much more than just a tasty drink that can help you get over an ex or gives you the inner confidence of Beyoncé. It can be a platform for constructive forces that influence the biomes and ecosystems we choose to live among, while providing bread to communities that support initiatives positively affecting these forces.

Although I am sure there are contradictions (there are with everything), let's be honest, if you're a professional, having your hives act strictly as pollinators for industrial farmers, is the side of apiculture you'd prefer not to be on. Mead can provide beekeepers with an opportunity to be a part of a new, growing market, while lowering the percent mix of their business associated purely with pollination. Why not sell your work into a customer base that has a greater likelihood of encouraging the facets that are important to you and your livelihood?

A cardinal value of mine is: support your allies. The planet is everyone's ally. Most mead makers are holding up their end of the deal by working with local beekeepers and sustainable farmers. Now we just need the beekeeping and farming communities to take their positive contributions a step further and call the cavalry to the bar. They won't be disappointed. BC

ELIZA JANE DONAVAN

Young Female Beekeeper In The 1870s

Albert **Chubak**

A year ago, while sifting through old documents related to beekeeping a letter was found that could not be forgotten. What could possibly be so memorable to etch its own place into current world challenges and thoughts? Many will know who Brigham Young is. Not the University but the American Moses, Lion of the Lord, the founder of Salt Lake City and hundreds of other western cities, the western colonizer of the Territory of Deseret, the 1st territorial governor of Deseret and later Utah. This western frontier captivated the imagination of easterners in magazines and books of the day with speculation on ancient treasures of gold and mystical places, and of course options of new beginnings for young families. One such 1870 magazine reported the viability of raising honey bees in this western land. This beekeeping article written by N.C. Mitchell caught the interest of an impressive almost forgotten lady in beekeeping, Mrs. Eliza Jane Donovan of Indianapolis Indiana.

State of Affairs in Utah Territory about 1870

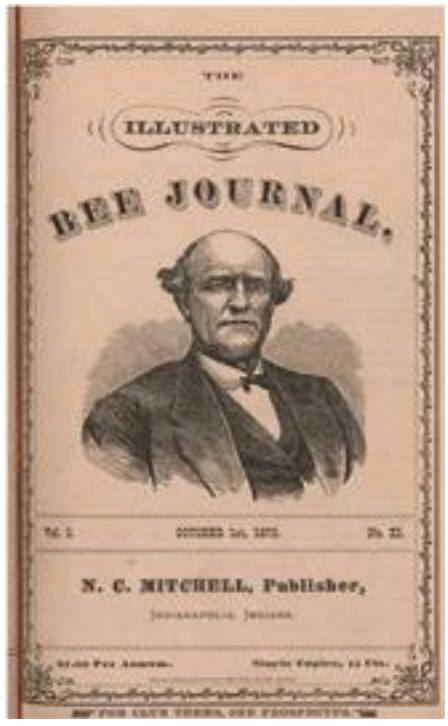
A background of what was happening regionally in Utah about 1870s. At this time the Civil war had just ended which emancipated thousands of people. The Transcontinental railway lines (on May 10th 1869 the Union and Central Pacific railroads) had just joined at Promontory Point in what is now northern Utah. W.D. (William DeWitt) Roberts of Provo Utah brings the first commercial hives into Utah and in 1871 the Utah Central railway manifest shows a cargo which included 18,000 lbs of bees arriving in Utah Territory from the west. According to the Salt Lake Herald October 13th 1872 W.D. Roberts was the first to export 35-36 stands of bees from Utah to Idaho and Montana *"…on Friday last, started a wagon with some thirty-five or thirty-six stand of bees for Montana, and will leave to-day himself for the destination. Having been highly successful in his bee operations in this Territory, and in bringing on a large number, he now proposes to make an equal success of the business in Montana and Idaho".*

Then in 1874 Mr. Roberts was chosen vice president of the North American Bee Society. Regional aboriginals were still opposing manifest destiny of eastern settlers westward with arrow and bullet. Gold, silver, copper, and coal mining was flourishing. Utah's Black Hawk War was underway, with Chief Antoga Black Hawk passing away in 1870, ultimately ending in 1872 as federal troops suppressed the conflict. In 1870 Utah gave women the right to vote, which later congress disenfranchised in 1887 with the Edmunds Tucker Act.

At this same, time Eliza Jane Donavan's carefully thought out letter arrived in Salt Lake City addressed to Brigham Young and was placed on his busy desk, but he never responded. The 20-year-old Mrs. Donovan read an article in a local beekeeping journal which peaked her interest to the point she wrote the following letter to the aging 69-year-old legend Brigham Young of Salt Lake City. The magazine was undoubtedly the "The Illustrated Bee Journal" written by N. C. Mitchell printed in Indianapolis as stated in her letter, but with a slight name variation of the author.

Eliza Jane Donavan wrote:

"Indianapolis Indiana August 20th 1870. Mr. Young Sir, I learn from Mr NC Michel edition of the Illustrator Bee Journal published in this city that the people of Utah are becoming interested in the subject of Bee Culture. Also that your climate is well adapted for the production of honey. I and my husband have been engaged in beekeeping for the last two years. I like the business very much and think it both pleasant and profitable business for women, as a woman can handle and attend to bees just as well as a man indeed I have done most of the work in our Apiary this season and we have about one hundred and fifty colonies of Bees mostly Italians which I consider far superior to the Black Bee. I understand the business perfectly and have been very successful in [word is indecipherable] black bees. I have a number of colonies of Italians with very fine Queens in them. I wish to spend this coming winter in your City of Salt Lake. Please tell me what these bees will bring their colony as I would like to take some of theirs with me and if any of the Ladies there wish to learn to manage these little pets I should be happy to instruct them have you any white and red clover there. What would a small house of three or four rooms rent for. I am determined to make a change of climate and think Utah will suit me if my business would suit the people there. Pardon the liberty I have taken to address



Taken from the Digital Collections University of Wisconsin-Madison Libraries, The Ecology and Natural Resources Collection, "The Illustrated Bee Journal Vol. 1, No 11 (October 1, 1879)

you but I thought you could give me the desired information if any one could. Yours Respectfully

Eliza Jane Donavan

PS. Please address immediately and oblige Mrs. E J Donavan, County of St Clair and Tenesee Streets, Indianapolis, Indiana"

Putting this letter into perspective helps us understand how rare a proposal Eliza was suggesting. Here are a few rare thoughts:

- She is a 20-year-old married lady suggesting to Brigham Young that she visit Salt Lake City to teach 'ladies' how to manage bees
- She refers to bees as pets
- Presents that women are very capable of caring for bees
- Mentions that beekeeping is an ideal business for women to engage in
- Is a second-year beekeeper in the mid-19th century with 150 colonies
- Shows that Eliza is educated, and is researching options prior to making a decision relocating
- Remarkable her husband had no apparent issues with her participating in a business, researching their move, writing a figure such as Brigham Young, and so on…

A 20-Year-Old Married Lady from Indiana writes the Aging Colonizer, Governor, and Prophet

According to the 1870 U.S. Census Eliza Jane Donavan is a 20-year-old married immigrant of Ireland living in Indiana with two daughters and one son under the age of four. She is listed as "keeping house", but is educated enough to read, write and attended to 150 colonies of bees! In 1870 she received verification that a beehive she jointly submitted to the U.S. Patent Office was approved, second woman to do so. At first thought, writing someone like Brigham may be intimidating, but clearly not so for her. The "fighting Irish" blood coursing through her veins allowed her to put pen to paper and off to the U.S. Postal Service her letter went.

Ladies Teaching Ladies

In August of 1870 Eliza Jane decided to write the territorial governor of the Territory of Utah after reading "The Illustrated Bee Journal", a local beekeeping journal produced by N.C. Mitchell in Indianapolis Indiana. In this journal legends like Quinby, Langstroth, King and others sparred regarding national beekeeping politics, methods, styles and so on. Eliza Jane learned enough she felt capable and confident to share her love with others, specifically ladies.

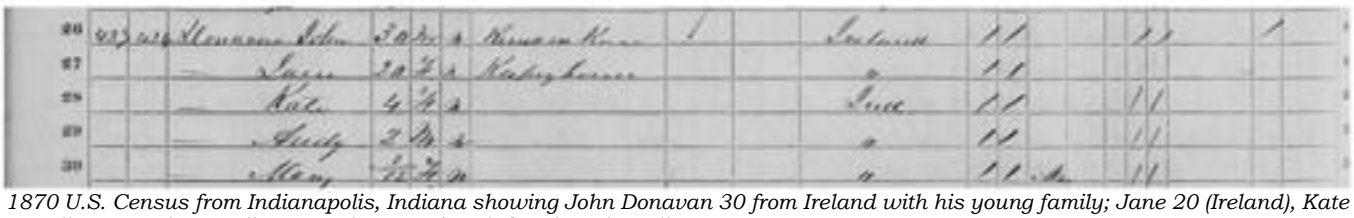
There were challenges of "male" controlled education in the mid-19th century as seen by this suggestion to teach the ladies. Placing a male figure in close proximity of adult females may have been seen as a threat to other husbands and in refined society seen as morally inappropriate. This concept of teaching within a specific gender group was both novel then and is still in demand in the 21st century.

This suggestion suggests ladies can teach other ladies better than a male counter-part. Of course, this sounds reasonable but nevertheless still hits the cords of the male ego.

A recent new term of "mansplaining" was 2010's New York Times new word of the year. Lily Rothman of The Atlantic defines the word as "explaining without regard to the fact that the explainee knows more than the explainer, often done by a man to a woman." According to Wikipedia "Mansplaining differs from other forms of condescension in that it is rooted in the sexist assumption that a man is likely to be more knowledgeable than a woman." It appears to be quite a rare challenge, this 19th-century young lady Eliza Jane, to suggest this approach to such a notable figure as Brigham Young. Due to probably many noted local factors it seems Mr. Young never responded to this request in writing.

Insights that a woman can offer to another woman in relation to modesty, sales, distribution, ethics in a male controlled environment, separation from other "female" duties, juggling the care of infants or children especially in this case where at least one was still of nursing age, challenging male counterparts, supporting a husband or even as a single lady, how and where to seek further knowledge/education, choosing a hive style that fits the constraints of a lady, how to deal with the appearance to men of a successful woman and perhaps what threats this all poses to a wife/mother/lady. Many challenges had to be overcome including, Sunday labor, utilizing other hired hands such women versus men, raising capital, banking, perhaps the challenges of obtaining a business license, and on.

Eliza Jane may have also heard the news women



1870 U.S. Census from Indianapolis, Indiana showing John Donavan 30 from Ireland with his young family; Jane 20 (Ireland), Kate 4 (Indiana), Andy 2 (Indiana), and Mary 2/12 (infant born in Indiana).

1880 U.S. Census from Indian Creek, Hancock County, Kentucky showing a growing family, with John listed as a C. Laborer (coal laborer), and Jane listed as Keeping Home. Five children are included in their family; Kate (14), John (12), Mary (10), Maggie (8), Rose (6). Unsure the name changes of their only boy from Andy (1870 U.S. Census) later to John (1880 U.S. Census).

A Closer Look

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Clarence H. Collison

were given the right to vote in this new western territory, opening the gate to other potential rights of the women's suffrage movement.

Bees As Pets

It was a refreshing thought Eliza Jane penned that she viewed honey bees as pets, and not simply as livestock. This reference uniquely separates the caring of bees from the traditional honey management usually seen. As pets, the first thought may be a relationship can be nurtured with the colony. This intimate relationship between beekeeper and colony is still challenged today. Managing a colony differs if viewed in a relationship of a pet, verses livestock where the end goal is solely for financial gain and slaughter.

Today there are many benefits of caring for a pet, many of which were not perceived in the mid-19th century – decreasing stress, lowering blood pressure, pain reduction, improves mood and the numerous other modern scientific rational. Perhaps Eliza Jane was thinking well beyond her time, but also, she may have felt activities beyond child rearing and household duties were needed for her contemporaries. Meaningful activities build self-esteem and purpose, not to mention an increase in available spending money.

Gardening too is an activity many rural and city women participated in, where bees could aid in both production and beauty of a garden. Beauty of a garden is often overlooked by men, but essential to many women.

Italians Verses Black Bees

Many early references exist to the type of bee used in the United States as a "black bee." In Utah as early as 1860, references to a black bee being the typical bee but attempts to replace it with the Italian honey bee began in the 1860s and 1870s. The letter by Eliza Jane stated she was trying to change to the Italian bee from the "black bee" as well. By the late 19th century magazines are selling the calmer Italian honey bee as the black bee fades out of use.

Dr. Joseph Carson of Alaska claims the darker bees do better in long cold Winter climates. He claims, "I prefer the darkest bees I can get. No whiz-bang college educated bees – just good, hard-working, gentle, dark-as-night bees. The lighter the bee in color the more they eat and shutting them down for the Winter is tough to do. No, I do not use Russians. If you want a pet, buy a horse. I use Carniolans or Caucasians, or as close to the German Black as I can get. They shut down for the Winter, lay prolifically in Spring, are gentle as can be, and propolize the hive very well for Winter." **http://digitalwasjournal.advancedpublishing.com/?issueID=28&pageID=34Types** of European Black bees, include their traits.

Typically, the darker the bee the more aggressive it is, however aggression is also based on situation, environment and seasonal issues affecting the colony.

Women mastering beekeeping and needs of income, honey, household duties

During the Great Awakening of the early 1800s women began entering into the work force and were producing income. During and after the American Civil War where 620,000 men died there was a greater need for women to work. It wasn't until the 1860s when the Women's Suffrage Movement saw women able to vote in States such as Wyoming and Utah.

HARDY RACES.

The most beautiful bees are not the ones that store the most honey. Bees, if bred for color instead of other more desirable traits, will naturally go backward and deteriorate in industry; Hybrids are the best honey gatherers, but generally very wicked to handle; most of the bees in California are hybrids. A cross between the Carniolan and Italian bee makes a good strain for honey gathering. Carniolans, after once being introduced or blended into an apiary, hold their own wonderfully; their markings may be seen in myriads of generations after. The Carniolans are the best all-purpose bee that I know of. In the upper Sierras, they are of especial value. Where heavy, deep snows fall they seem to winter splendidly. In Sierra county a bee-keeping friend states that at one time his hives were covered with twenty-five feet of snow, and when he dug htem out, all his Italian and black bees were dead, but the Carniolans were all alive and in a vigorous condition.—S. L. Watkins, in Farm and Home.

A young bee keeper, and a good farmer told a Farm and Home correspondent recently that without any help he took the past season 2,000 pounds of honey from thirty-five to forty colonies, which he sold for $300 and the time spent working with the bees was not as much as his neighbor farmer spent loafing at the store.

Salt Lake Herald February 10th 1896. Obtained from the University of Utah Newspaper Collection.

Business for a women in 19th century America

"The trend in the belief of feminine inferiority was halted as women effectively managed organizations not directly related to the family. To alleviate the fears of men that their wives were concentrating on issues unrelated to the family, piety did not keep a wife from her proper sphere. Meetings could be held in the home. Young children could be brought along the same way they would be when visiting friends. The lady of the house would demonstrate her domestic skills by cleaning the house before her guests arrived and by making sure they had something to accompany the tea which could be served during a meeting. "And, "The wife's role was to complement her husband, reflecting credit on him and herself.

A man took a wife to look after his affairs, and to prepare his children for their proper stations in life. It was a wife's duty to care for her husband's interests. To these ends, she was to be mistress of the family and run it well enough so that her husband would only enjoy it and could focus his attention on the matters of the world. As long as the household could be managed within the bounds of the husband's income by a woman who practiced and taught piety, purity and submissiveness, then "all [was] as it should be.

Books devoted to housekeeping and cooking, made it perfectly clear that a woman's domain was her home and she was expected to have total charge of all within. If she was unfamiliar with family management, she was urged to consult the authorities."(**http://www.teachushistory.**

org/detocqueville-visit-united-states/articles/early-19th-century-attitudes-toward-women-their-roles)

Eliza Jane Donavan was maintaining her piety by effectively managing her home, children and increasing her colonies which no doubt supplemented her family's income. Her efforts complimented her husband, as well as displaying a great deal of inner strength for a lady of the period. This was exactly what she had hoped to teach to the ladies in Salt Lake City.

Responsibility of 150 colonies

Eliza Jane referenced she was a second-year beekeeper with 150 colonies, and understood the bee business perfectly. Unsure of what was then considered a colony, nor the hive style she employed, or even the method of honey processing used – this is still a feat as a second-year beekeeper. To some degree her husband John was employed, leaving a young mother of three with at least one infant nursing age to attend to 150 colonies.

She had some understanding of splits, queens, and was willing to teach others. She also took the time to read a local beekeeping journal, which may have allowed her personal interaction with the publisher and those referenced in its pages. She clearly had enough invested and understood beekeeping to the level she created and patented a beehive. This task of obtaining a patent was achieved only by one female prior to Eliza Jane Donavan.

She was a problem solver and to some degree displayed traits of an over-achiever. Also unclear is how much wood working experience she possessed. Not power saws and drills of the 21st century, but hand tools which require craftsmanship unique to a 20-year-old young Irish immigrant mother in 1870.

The jaw drops lower and lower as all these issues are factored into a panorama of what made up this 19th century woman.

We learn later Eliza Jane Donavan patented a beehive

In the same year as the date of her letter, Eliza Jane received approval thus a patent to the U.S. Patent Office for designs of her version of a beehive. Her design had side panels that fanned open allowing inner frames to separate like pages of a book. It appears the frames were still attached in some way to the rear of the hive. This adaptation allowed for simple inspections, but it stands to reason that the bees would reposition themselves causing issues with closing it up. A question remains on how the frames were attached to the rear of the hive. Interesting simple hive design ideal for a lady not wanting to man-handle the 5lb-8lb frame.

Utah State University Photograph Collections. A couple in Utah in 1880s working in a beeyard.

Women invented many items during the 19th century, those inventing beehives were:
Hornbrook, Triphena P. patent 32,367
Donavan, Eliza Jane patent 108,893
Gibson, W. T. patent 108,893
O'Connor, Elizabeth patent 119,991
Farnam Harriet A. patent 122,242

There were 187 female agricultural patents granted. Of the top female patents granted, Cathrine A Griswald obtained 31 patents related to sewing. The top ten lady inventors of the 19th century amassed 146 patents alone. http://staff.lib.muohio.edu/shocker/govlaw/FemInv/sub.php?iname=Agricultural

Moved to Kentucky and raised a family

Eliza and her family lived in Indianapolis Indiana in 1870, then a decade later appeared in the U.S. Census at Indian Creek in Hancock County Kentucky. This move was about a 200-mile trip south, just beyond the Indiana boarder in Kentucky. Indianapolis to Indian Creek was a huge difference in landscape, perhaps a better environment to raise colonies and an opportunity for her husband John Donavan to work in the coal mines. The first commercial coal mine was begun in Kentucky in 1820. In the 1880 U.S. Census John is listed as a "c laborer", which denotes "coal mine laborer". The move to Utah obviously fell out of favor perhaps due to Brigham Young not responding, or limited information on beekeeping and conflicts of marriage lifestyles at the later end of the 19th century.

Women of today who are pioneers in beekeeping

There are many significant women today in beekeeping who are pioneering like Eliza Jane Donavan did, as well as countless "ladies teaching" the amazing intricate world of honey bees and beekeeping. An attempt was made to document such a list; however, it grew and grew with incredible biographies for each. This list could be a book unto itself, or master-list of "lady" speakers in every aspect imaginable with regards to *Apis* (honey bee).

Perhaps a Eliza Jane Donavan conference is needed today, Ladies Teaching Ladies

There is a new movement brewing today where women are leaning towards a beekeeping conference where women are the only ones on the speaking agenda. Ladies teaching not only other ladies but everyone. As with Eliza Jane, she had an innate understanding to what was needed for a woman to succeed in beekeeping in 1870. Our beekeeping "ladies" of the 21st century are masters where all can benefit from their experience at every level.

Perhaps in the next year or two a beekeeping conference will be organized for all to attend where the speakers are chosen solely from the multitudes of amazing 21st century beekeeping "ladies". BC

Autumn Management

In The Southeast U.S.

David **MacFawn**

Autumn preparations are frequently deemed the most critical of any season. Beginning in September and continuing through December, Autumn is when preparations are made for colony overwintering. How well your colonies are prepared in Autumn will determine, to a great extent, how productive they are next Spring. Now is the time to begin planning these management operations.

Let's Look at The Queen

The colony should be requeened no later than August if the colony does not have a young queen, (less than one-year old), queen going into Winter. By requeening in August, the new queen has enough time to achieve four to five frames of winter worker bees. November and December are typically the lowest brood levels during the year, sometimes even reaching a broodless period. A young queen will also help minimize swarming next spring and helps reduce queen failure during heavy colony build-up in the months of February and March.

Food & Brood

Feeding and brood assessment should occur August through September. If the colony does not have enough bees in August, the colony should be fed 1:1 sugar syrup to stimulate brood development. Internal feeding should be used to prevent robbing, also, use entrance reducers.

Early in September, if the colony does not have at least 50 to 60 pounds of honey (medium feed chamber + honey stored in the brood chamber), the colony must be fed. In South Carolina, the bees begin to store sugar syrup in the colony from mid-September through October. This results in a contiguous storage of honey in the colony without any gaps.

However, when it gets colder, usually after October, they will stop taking the feed. The bees will leave sugar syrup in the feeder and no longer store it in the colony.

As the Winter progresses, the bees move vertically through the equipment stack consuming honey until they reach the inner cover. Hence, if the bees use all their stored honey, they will huddle under a pail feeder placed on top of an inner cover to access sugar syrup (carbohydrates).

Also important besides honey storage is enough pollen in the brood chamber, typically two frames (frames two and nine in a fully filled 10 frame brood chamber) will allow the bees to build-up from December until around the first of February. This is when the Maples bloom in South Carolina, which is usually a good early bloom.

Be aware, in some locations, there are pollen dearths in the autumn, which may impact winter bee development! If either enough honey or pollen is not available in the hive, the colony should be fed honey or sugar syrup or pollen or pollen substitute. It takes honey and pollen to raise young bees.

New Rule of Thumb

Weak colonies are defined as ones that do not have at least four frames of brood, sufficient honey stores, and sufficient pollen stores. The old rule of thumb, which is no longer recommended, was to combine a weak colony with a strong colony, supposedly resulting in a strong colony. The weak queen was killed and the colonies inspected to ensure they were disease free. Combining two weak colonies was not recommended.

However, this old rule of thumb has been replaced in favor of culling weak colonies in autumn. This change in approach is based on the *difficulty in detecting diseases and viral infections,* as well as the costs of labor, equipment, and feed to sustain a weak colony over winter. It makes little sense to save a weak colony if it leads to further illness or compromises other viable colonies.

Good Management Practice in Winter

During colder months new equipment should be assembled and older equipment should be repaired. New unpainted woodenware should be primed and painted with two coats of a high-quality paint. Old equipment in need of repair and painting should be swapped out of the field to a location accessible to be worked on in the November, December time frame. It is less expensive to maintain your existing equipment than to purchase, assemble, prime, and paint new equipment. New equipment that is procured and assembled may be determined by your colony growth plan and sales and marketing plan. In South Carolina's high humidity, I have found equipment assembled with a high-quality water-proof glue and nails and painted with a coat of high quality primer and at least two coats of good quality paint, will last about ten years prior to refurbishment.

The queen.

Keep Planning

A colony growth plan, plus a sales and marketing plan should be developed. These plans identify existing equipment and resources and any new equipment that will be required for replacement or growth. Necessary new bee yards for the upcoming season should be secured based on your colony growth plan, and sales and marketing plan. Financial analysis numbers should be analyzed to determine if you can cover your costs with the number of colonies and their honey production in an outyard. If pollinating, you need to first analyze expenditures to determine pollination rental rates to ensure a reasonable return. Then pollination contracts and fee structures can be offered to interested parties. For more information refer to my book, **https://outskirtspress.com/BeekeepingTipsandTechniquesfortheSoutheastUnitedStatesBeekeepingFinance**

Varroa mite levels, having been monitored throughout the Summer, should be again checked in August and also in October and November. The reader is referred to Randy Oliver's site: **www.scientificbeekeeping.com/** for more information on what are acceptable levels. In Autumn the queen will reduce her egg laying, resulting in an increased number of *Varroa* mites becoming phoretic (on the bees and feeding) or dispersal (*Varroa* on the bees and not feeding) rather than in the brood. This will result in higher mite levels but more accurate mite readings. Treating for *Varroa* mites should be considered based on the mite levels.

IPM

Mite levels can be determined using either the sugar roll or alcohol wash methods. Sticky boards are no longer considered reliable for obtaining accurate mite levels as too many factors come into play when assessing various sized colonies at different times of the year. Usually, November and December are the queen's lowest laying time and an excellent time to treat. Most treatments only kill phoretic/dispersal mites (except Mite Away Quick Strips – MAQS or Formic Pro) so November and December are an excellent time to treat with Oxalic Acid since *Varroa* mites are on the bees and not in the brood.

Feeding – often sugar syrup in the south will not freeze in the Winter. (MacFawn photo)

In South Carolina, the colony will need four to five frames of Winter bees to get the colony through the Winter until late March or early April. Treating as necessary in August will ensure healthy nurse bees which will help raise healthy Winter bees. Winter bees will start emerging at the end of August to first part of September. Winter bees have more fat/Vitellogenin in their bodies that enable them to overwinter better. Also, the winter bees are confined and do not forage as much which aids in their longevity.

Last Minute Thoughts

If you need to feed in the Winter or Spring, feed continuously until the nectar flow starts. I prefer to use pail feeders inverted over the oval porter bees escape hole in the inner cover. If needed, the bees can huddle under the pail feeder. Other feeders may have an issue where the bees cannot access the syrup when they are clustered in cold weather.

In the Fall, if not done previously during the dearth period, reduce your entrances with an entrance reducer to minimize robbing and yellow jacket problems. Yellow jackets will invade weak colonies and kill them. Also, queen excluders need to come off as they can prevent the queen from moving up with the cluster.

Storing frames are also of concern. There are two factors to consider when storing frames of drawn comb. Brood frames will be affected by wax moths. To store brood frames place them in a plastic bag and freeze them for several days. The wax moths are after the dark brood section of the comb. Clear white super frames are typically left alone by wax moths. Frames with foundation are rarely affected by wax moths. I stack supers with drawn comb at 90 degrees so that light and cold weather gets to the frames. Wax moth larvae are killed when it gets to freezing temperatures, especially if they are outside of the cluster. A final consideration is extra equipment. Any extra equipment should be removed from the hive due to Small Hive Beetles (SHB), especially if it is a weak colony. This is due to the bees not being able to care for the empty space where SHB can hide. As mentioned earlier, *if it is a weak colony you should consider culling.*

So.....

Autumn colony management will determine your success next Spring to a great extent. In much of the southeast, the colonies should be fed to ensure at least 50-60 pounds of honey in the combined brood and feed chambers. Weak colonies should be culled and not combined. Colonies should be assessed for *Varroa* and treated if necessary. The colonies should go into Winter with a young vigorous queen. A colony growth plan, and sales and marketing plan should be developed to direct your tasks and efforts. BC

Special thanks to the following for reviewing this article: Sally Adams, Larry Coble, Freddy Proni.

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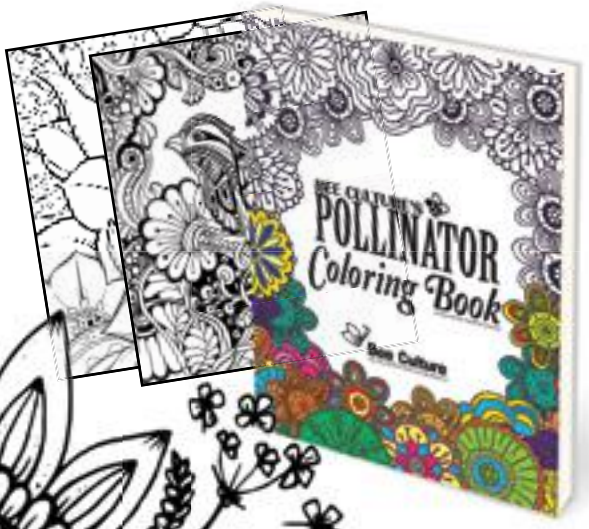

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Bee Culture

The Magazine Of American Beekeeping

Walnuts As Bee Plants

Connie **Krochmal**

This ancient group of plants dates to the Jurassic Age. Around 15 to 20 species are native to the New World, Europe, and Asia. Six of these occur in America. This article emphasizes the native species.

Serving as an important food source in ancient times, walnuts have long been enjoyed by humans and other animals.

All walnut species are sources of nectar and pollen in addition to honeydew. The honeydew yields a fair quality honey that is often used for baking.

General Description

Usually slow growing and long lived, walnuts are broad headed species with a somewhat open crown and a straight trunk. They're mostly deciduous trees although a few can be shrubs or at least shrubby. Due to their tap roots, they often withstand some drought.

Members of the walnut family, the plants are generally medium-sized to fairly large. Depending on the species, they can reach 20 to 65 feet or more in height.

Arranged in a feather pattern, walnut leaves release an aroma when crushed. The large, alternate, compound foliage consists of odd-pinnate leaflets, up to five inches in length. They're usually greenish-yellow.

Rather inconspicuous, walnut blossoms appear before the leaves in Spring. The greenish male blooms form slender, pendulous catkins. The females open in terminal clusters.

While most walnuts are partly self fertile, they produce better nut crops if at least two trees of the same species are planted. Ripening in late Summer into Fall, the large drupes vary slightly in shape and size, according to the species or variety. When mature, the thick husks generally don't split with the exception being the Persian walnut.

Grafted trees typically bear nuts about two to five years after planting, while seedlings take longer. The trees provide reliable crops of edible nuts with mature plants producing around 150 pounds annually.

Growing Walnuts

Walnuts are cultivated as ornamentals and for timber and nuts. A good choice for beekeepers provided ample growing space is available.

The slow growing English or Persian walnut (*Juglans regia)* is the most commonly grown introduced type. Hardy to -25°F, the tree abhors hot climates. Fifty feet tall and 30 feet across, it thrives on well drained hillsides. Carpathian is the hardiest variety – to zone four.

The Japanese walnut (*Juglans ailanthifolia)*, hardy to zone five, is forty feet tall and wide. Heartnut, a disease resistant variety of the Japanese, is only 20 to 35 feet in height. It is hardy to zone four.

Other popular cultivated ones include butternut and black walnut. Walnuts do best in a reasonably rich, moist soil, especially a deep, rich alluvial one. Well drained loams and light sandy soils are suitable. The preferred pH range is 5.5 to 7.0.

The hardiness can vary slightly by species or cultivar. Numerous types of walnut trees are readily available from fruit plant catalogs, such as Fedco, Stark Brothers, and Oikos.

Some walnut trees cause walnut wilt, especially black walnut and butternut. A chemical produced by the roots, nuts, and leaves can adversely affect nearby plants.

Vulnerable species include certain ornamentals and some crops, particularly tomatoes, apple trees, and brambles. To prevent walnut wilt, plant walnuts a safe distance – at least 60 feet away – from the vulnerable ones and remove the nuts and walnut leaves that drop from the tree.

When transplanting, use young plants for best results. Walnut trees are generally propagated by grafting or budding. Seeds require a long time to germinate and produce plants that can be quite variable. Typically, seedlings are mostly used as rootstocks.

Spacing depends upon the species or cultivar, but generally they're spaced at least 40 feet apart. Butternuts require only 30 to 40 feet, while black walnuts need 80 feet or more.

Walnut trees require minimal care once they're established. During the Spring of the second year, begin adding fertilizer annually using the amount indicated on soil test results. Nutrients can also come from compost.

Place mulch around the plants without allowing it to touch the trunks. Until the plants are well established, water as needed. Although mature walnut trees can withstand prolonged dry spells, they will bloom and fruit better when adequate water is available throughout the growing season.

Young walnut trees should be pruned so they develop a strong central leader and a good branching system. Pruning is rarely needed on established trees other than to remove diseased, dead, or damaged limbs or to correct the plant's shape. This should be done during the Fall for the trees bleed heavily from late Winter into Spring.

The plants generally experience few serious problems. Aphids tend to be the most common pests. Other potential insects include scale insects, spider mites, walnut caterpillars, codling moths, fall webworm, and occasionally the walnut husk maggot.

Recommended Native Walnut Species

There is pretty much a native walnut for most every region of the country.

The following are recommended for bees.

Arizona walnut or nogal (*Juglans major)*

This native occurs in Oregon, Idaho, California, Nevada, Arizona, New Mexico, Texas, and Oklahoma.

Juglans californica.

Its habitats include streambanks and dry rocky ravines.

Certain things distinguish this species from the other western walnuts. Its leaves turn yellow in the Fall, while its nuts are double the size of black walnuts. Finally, the species grows mostly at higher elevations – to 7600 feet.

Arizona walnut is suited to zones nine through 11. The fast growing plant is especially long lived – up to 400 years. A small to medium sized tree with an open, broad crown and straight trunk, it is mostly 30 to 50 feet in height with a trunk that is over four feet in diameter.

The young branches are hairy. The nine to 13 leaflets (rarely 19) are oblong to lance-like, toothed, and hairy when young. They reach three to four inches in length except for the lower ones on the leaf stalks, which are smaller.

The hairy, yellow male blooms form long catkins, while the females emerge on short, terminal, hairy spikes. The small, round nuts with thick shells are edible.

Preferring deep soils, Arizona walnut can withstand wind and heat. It does best when watered during prolonged, dry periods.

Black Walnut (*Juglans nigra)*

Black walnut is most common in the East and Central regions. Its range extends southward to Florida and westward to North Dakota and Texas. Suited to zones four through nine. The tree grows in floodplains and bottomlands with mixed hardwood species.

The round to oval headed, slow growing plant can require a hundred years to mature. Among the largest nut trees, they're mostly 50 to 75 feet tall and wide, particularly the cultivated forms. The wild ones can be 100 feet tall with a trunk that is six feet in diameter.

Black walnut bears coarse foliage, two feet in length, with 11 to 23 leaflets that are 1½ inch wide.

Often grown as ornamentals, grafted black walnut trees begin bearing fruits four to seven years after planting. Ripening in early October, the one to 1½ inch wide nuts have a distinctive taste. The shells are hard to crack.

This tree prefers a deep, rich, neutral to slightly alkaline soil. Some varieties are pest resistant.

Butternut (*Juglans cinerea)*

Also called long walnut or oilnut, this does best in zones four through eight. Native to the East and Midwest, its range extends southward to Georgia, and westward to Minnesota and Arkansas. It grows in the same types of habitats as the black walnut.

Butternuts are shorter lived than most walnuts. With a broad spreading crown, this fast growing tree resembles black walnut but is shorter – only 40 to 60 feet tall and wide. It features fewer leaflets. Both the nuts and the kernels are smaller than those of the other species.

With a rich, pleasing buttery flavor, the elongated to oval nuts feature a hard, thick shell. Well suited to the North, this tree rarely suffers frost damage and is among the hardiest of the walnuts. Butternuts can be tapped for sap just like maples. The plant can be pruned and trained as a bush or tree.

Due to the strong limbs, the plant seldom develops weak crotches. Butternuts will need watering during the growing season if rainfall is insufficient. It adapts to alkaline soils.

Hind's Walnut (*Juglans hindsii)*

Also known as the northern California walnut and California black walnut, this very lovely native is often grown as a street tree. It occurs along river banks, streams, and rocky or gravelly soils in California.

Preferring a well drained soil, this plant has several features that set it apart from other western walnut species. Its leaves are bright green while the others are greenish-yellow. In addition, this nut has a smooth shell.

Suitable for zones eight through ten, the narrow headed, small to medium-sized tree with a broad crown has a single straight trunk. Typically, it is 30 to 40 feet in height and nearly as wide although it can sometimes reach 50 to 65 feet when given ideal conditions.

The young branchlets are very hairy, while the leaf stalks are especially downy. Reaching a foot in length, the coarse leaves contain 15 to 19 leaflets, 2½ to five inches long. Often toothed, these are oval to lance-like. They're hairy underneath along the veins and mid-ribs.

The male blossoms form hairy, yellow-green catkins. The female flowers open in clusters of one to three on short, terminal spikes.

The hairy, globose fruits are 1¼ to two inches wide. The small

Juglans hindsii.

Juglans microcarpa.

Butternut.

nuts are thick shelled. This is used as a rootstock for grafting English walnuts.

Hind's walnut is tolerant of dry conditions.

Southern California Walnut (*Juglans californica)*

Also known as the Southern California black walnut, this large shrub or small to medium-sized, slender tree is common in California. Suited to zones eight and nine, the fast growing species can live150 years or so.

Compared to Hind's walnut, the southern California walnut has smaller fruits with smooth, hard shells. Its habitats include canyons, riverbanks, hillsides, and bottomlands. Growing to 4300 feet elevation, this thrives in poor or dry soils.

Typically, this is 12 to 30 feet tall and seven to 15 feet wide, although it has occasionally reached 40 feet in height. Typically, southern California walnut tends to have multiple trunks. It features an open round crown, a short trunk, downy young branchlets, and hairy leaf stalks.

The leaves of Southern California walnut are a foot in length. This typically bears nine to 15 leaflets. One to 2½ inches long, these are blunt and oblong-lanceolate. They're greenish-yellow and paler beneath.

The yellow-green male blooms form slender catkins in Spring. The small females open terminally on new wood with one to four per short spike. Nearly rounded, these nuts with hard shells have a pleasing flavor.

Texas or Little Walnut (*Juglans microcarpa)*

This tree is sometimes called river walnut. Often grown as an ornamental, Texas walnut does well in zones seven through ten. Native from Nebraska southward to Texas and westward to New Mexico and Colorado, the plant is frequently found along creeks, streams, rivers, washes, and dry rocky ravines.

Various identifying features make this plant stand out. It tends to be rather shrubby with multiple trunks. The quite aromatic leaves contain a larger number of leaflets. They're more slender and delicate looking than those of other walnuts.

This bushy, small to medium sized plant features an open crown. Texas walnut is generally 15 to 20 feet or so in height, but occasionally can reach 30 feet with a spread of six to 15 feet. The young branchlets are hairy.

Around 1¼ foot in length, the leaves consist of 11 to 25, greenish-yellow, narrow, lance-like, toothed leaflets, three inches long. Their undersides are lighter colored and hairy.

The male catkins are two to four inches long. The females form terminal clusters with one to four blooms. The globular fruits, hairy when young, are borne in clusters of two to three. The small, round nuts are only ¾ inch in length.

Texas walnut prefers a well drained, lime-rich soil. It adapts to dry rocky conditions. BC

Beeyard Thoughts, Observations, and Updates

Colony splits – Giving it your best guess – then worry

Odds and Ends

Nothing new

Splitting bee colonies is nothing new. In years past, bee packages were not commonly available to beekeepers. Splitting (frequently called dividing) bee colonies was the best way to make colony number increase – other than chasing swarms.

Then for many years, packages were available at a competitive cost. It was simply cheaper to buy package bees and keep your strong colonies as honey producers.

The present day cost of packages and queens has inspired me to review the process of making split colonies from my existing colonies. Dividing is not an exact process. Other in-depth articles and books have presented details on making colony splits. My intent here is to review some of the fundamentals of making colony splits, but also to include actual bee yard situations and the extraneous things that happen that make beekeeping challenging.

Splits from my own colonies

In this discussion, I will need to say several times that there are no "standard" splits. True, there are types that are more common than others, but in general, the size of a split is very nearly a personal thing.

This past Spring, from 24 established colonies, I arbitrarily chose to make ten splits. I have an abundance of four-frame and six-frame nuc boxes. I chose to make six-frame splits. I spent more time than I care to confess scraping and preparing old comb for reuse in the nuc boxes. This was a concession on my part for I had considered phasing out these old frames – for no other reason than they were old. Increasingly, as have so many others, I have become concerned that these combs are carriers of some unknown ailment like dysentery or chalk brood or even worse American foulbrood or worse yet – miticide residues from previous mite control programs. But I have no definitive proof that any of these problems were present and I had the combs in proper numbers readily available. Then, the cost and labor of assembling new frames had to be considered. Hence, when the split day came, I used the old combs.

So much as possible, I put in three empty frames and two frames with residual quantities of honey, a frame of mixed brood (some of both open and capped brood) and just the right number of adult bees (Probably 1½# or so). Some nucs got more while some got less. But I felt that I had a bit of a security blanket in that the small, confused colony at least had a bit of food for a few days. *(As it worked out, they would need it.)* I didn't paint the nuc boxes but they were scraped reasonably clean and were otherwise suitable for short-term use.

An old procedure found in old books addressed the issue when a queen was being suffocated by a small cluster of workers tightly confining the queen. She was said to suffocate. Would it not seem more plausible that the queen was being overheated by the small tight cluster?

The old procedure was to drop the bee ball into a pan of water. Dunk and submerge the bees until the ball released. I suspect the queen was cooled by the dunking but I doubt that it could be said that this procedure was good for the bees.

Now that is just one more thing to take to the apiary – a pan of water.

Why use nuc boxes at all?

Why use nuc boxes at all? The splits – if all went well – would outgrow the nuc boxes quickly. Why not just put the split directly into a single deep box and forego the preparation and moving the nuc boxes? That poses an excellent question and one for which I am not sure I have ready answer. I have only the thinnest bit of science but a much stronger gut feeling that a small colony is more "balanced" in a smaller hive box. Robbing by stronger colonies is a concern. Additionally, the labor in forming, closing, and loading the nuc boxes is less work (initially) than dealing with the extra equipment of a full hive. Finally, and most importantly, I could have the nuc boxes ready much quicker that I could prepare the single-deep hive. So I used nuc boxes.

Queens

Availability and cost

I bought my queens from a local supplier, who in turn, got them from a California producer. They cost me $35.00 each. Why tell you this? Because I have mentioned this shock in previous articles. In my beekeeping past, paying $2.50 for a "bug" was bad enough. The penalty is now much greater for making simple mistakes. But hey, I paid a $1.69 for a bottle of water. It's only money.

Queen management within the split

As is described in the "Tips" list, I prefer to release my queens directly rather than use the slow release

method. When all the time invested in this project is considered, the new queen stays with the spilt colony at least seven days. I can get a good idea of the caged queen's potential reception by the way the bees are treating the cage. Additionally, since I want this splitting process to go as quickly as possible, there is a chance that I unintentionally took the parent colony's queen. My new queen would be killed if she were released into this environment. If she is not treated kindly, I immediately recage her.

Additionally, I want to confine the queen as long as it takes for her be accepted in a friendly manner. Some splits take longer to accept new queens than others. Due to the scarcity and costs of new queens, the common recommendation has become to allow the queen to stay caged longer. I completely agree with this increased time, but with a couple of caveats; (1) leaving the queen caged longer – depending on the style of the cage – will result in significantly increased amounts of burr comb around the cage and (2) leaving the caged queen in longer will expose her to the vagaries of internal and external colony temperatures. I worry that my costly queen and her cage will be too far from the bees' area of activity. I worry that the nights become too cold or too hot. So on one hand – yes – leave her caged longer. It's safer. On the other hand, get her out as soon as possible. The risk of holding her in an improperly positioned cage is greater than a short introduction period. Neither philosophy is correct every time. In general, I am tending to leave queens in the cage longer and worry more.

Bees on the front of a freshly filled nuc box.

A few beeyard tips for making splits

1. Wear a good bee veil and keep the smoker puffing freely. Don't forget your hive tool (or you pan of water – grins).
2. Scan each frame carefully for the colony's queen, but don't spend more than a minute or so before a decision is made to take or leave the frame. You get too many bees in the air if the process selection drags out.
3. Unless you are prepared to use shallower size frames, don't spend any time with them. I find it to be too much trouble to remove tight shallow frames just to shake a few bees.
4. Putting one or two frames of brood in the nuc box seems to reduce the number of bees flying out when you open the box to add more bees or brood.
5. Due to #4, so much as possible, keep the nuc box closed.
6. Keep the amount of brood transferred comparable to the adult brood population transferred. This always requires guessing.
7. While I never do it, it is a good idea to record which splits came from which parent colony, in case I inadvertently take the parent queen.
8. The shorter time the bees in the nucs are confined, the better.
9. To avoid excessive drifting, don't position the nucs any closer than necessary when opening.
10. Unless you move the nucs several miles away, expect some of the bees to drift back to the parent colony.
11. I put the caged queen in the split in the field in an effort to calm the bees as soon as possible. I always use the direct release method rather than the candy plug slow release method.
12. With bees flying everywhere and exposed frames all about, expect to feel a good deal of uncertainty and confusion. Good news is that you can adjust the population of the split during the next few days.

Buying splits from the colonies of others

Based on availability, beekeepers can buy colony splits – of multiple sizes and varying prices – from other beekeepers – with or without queens. Everything is negotiable. Buying splits eliminates all the work of getting set up and searching through your strong colonies for proper frames and a compatible number of bees. Right? Well, not really. I just end up paying someone else to guess on my behalf. And then there are other unexpected challenges. Witness the following saga of several years ago.

I purchased 12 five-frame splits from another established and competent beekeeper. Due to all the requirements of frame exchange and nuc box return *(or me hauling nuc boxes to the beekeeper, but then there is the hassle of transferring the nucs to my boxes with the concurrent escape of bees or I could help with the splits and put them directly in my boxes, but that would take much more time. On and on it goes.)* Why this contorted discussion? Because I paid more for the nucs choosing not to implement frame-exchange and the beekeeper used paper corrugated board nuc boxes that could be discarded when I transferred the splits at my site. So I didn't haul my own nuc boxes to the split-site, opting to use the paper nucs instead.

I drove the 100 miles to the beekeeper's yard as heavy thunder clouds formed. We loaded the splits as quickly

Stinging Realization

"It's easier and less stinky to control Varroa *than it is to cleanup* Varroa *Winter-killed colonies – which are messy and stinky.*

as possible and used tape to stick the paper tops to the paper nuc boxes. I really, really, didn't want the boxes to get wet. Within speed laws, I quickly drove home without restroom or food stops. Heavy, ominous clouds threatened the entire way; even a few light showers came my way.

Upon my arrival at home an hour before dark, I discovered that four of the 12 tops had blown away. I had scatted some unknown number of bees over the last one-hundred miles. Now, the clouds and wind was significant – even bad. My small beekeeping staff began to rush about, but it was clear that this wind would destroy the paper nucs and blow them all about. What to do? What to do? What to do – now?

Radio word came of tornadoes in the area. While some nucs had no tops, all of the soft boxes were leaking bees and sagging due to the wetness. In frantic desperation, we put our box truck in a stand of pines and transferred the beleaguered nucs from the open pickup truck to the enclosed box truck. Tops were re-supplied to those nucs not having them. I left the roll-up door ajar two feet and opened the splits in the dark truck box just as torrential rain began falling. I went home and worried. I had more than $1000 in that box truck, but more importantly, I was supposed to know what to do, and I really didn't. I had never set up nucs during tornadic weather.

The next day was also rainy. Two days later, amidst bee confusion, we took the paper nucs from the truck box and installed them in standard equipment. Drifting and confused bees were everywhere, but at least they were in the general area. I sat a single nuc in the truck box to pick up stragglers. A day later, I sat that colony on the ground and moved the truck. I am very, very happy to tell you that all the nucs survived and look as good as they could after such an experience.

Transferred nucs just after the heavy rain.

My point here is that none of this was planned and none of my procedures can be considered traditional split implementation and management. What will I do differently next time? Nothing but hope for good luck and better weather.

Keeping bees is expensive

I'm over my word budget with Editor Kim, but next month I want to vent and make some suggestions about evolving modern beekeeping techniques. *(In other words, I had a caged queen die on my watch. Grrrr.)* BC

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The Quarto Group

Dead Colony Forensics

Dewey **Caron**

Bees die overwinter for a number of reasons. Of course, seasonal losses occur as well, and they too might have a number of root causes. By performing a dead colony necropsy we might be able to determine the likely reason for non-survivorship. Although dead colony examinations are often not clear cut, understanding the why might help us avoid a repeat the next time

This Spring I joined about a dozen brave individuals gathered in a Portland, OR club apiary mid-April, during a steady Oregon "liquid sunshine" rain event, to do a dead colony examination workshop. Temperature was low 50s, with only a couple foraging bees venturing forth from four of eight colonies. We did necropsy on two deadouts.

Dead colony autopsy, Spring 2018. (photo by Mandy Shaw)

Brood frames of Fall deadout. (photo by Deb Caron)

Fall deadout

The first deadout, a colony that died in the Fall before overwintering, proved to be a tough diagnosis (photo 1 shows deadout).

The colony was a mid-May nuc start, a donation to the Portland Urban Beekeepers (PUB) association. During the season the hive, although started late, grew from nuc-size and in the Fall consisted of a standard and a shallow. The shallow frames were quite full (>3/4ths of cells) with capped honey with no evidence of robbing. There were dead brood remains on three frames of the lower standard box, plus a small number (<3000 individuals) of dead adult bees on the screen bottom board and immediately outside the entrance.

The brood frames did not have the appearance of a normal colony. Two adjacent frames had widely scattered capped brood cells extending in an

Close up of frame with scattered capped (dead) brood from Fall deadout. (photo by Deb Caron)

oval over 1/2 of the middle of the frames; there was a fist-sized patch of compact capped brood but it was not contiguous with the scattered brood of the other two frames. There were no remains, or evidence, of winter cluster formation.

There were a considerable number of cells of stored pollen on five frames. Ample fungus and mold was evident in pollen cells and as a powdery, grayish mold on surface of cells. No wax moth activity was evident. Colony was sampled for mites with a sugar roll in September and had only two mites (<1%). It was NOT treated for mites as it was a non-treatment control. Colony was alive but noted as weak in a mid-October inspection the previous Fall. Individual colony records are kept of each colony in this apiary; they can prove handy in an necropsy.

Photo of the three frames with brood shows the frame with a patch of compact brood (held in my right hand) and two frames with very scattered brood (one in my left hand and the third on top of adjacent hive – see Photo 2). One frame with widely scattered capped brood remains is shown isolated in photo 3.

So what can we diagnose? The dead colony had lots of honey and bee bread stores so we can likely rule out starvation. Small number of dead bee bodies suggests a small colony but if we would believe death resulted from a too-small population of adults, there should have been evidence of a cluster with bees head first within cells and dead bee remains on the frame(s). There wasn't.

Thus our best guess for reason for colony death is a colony that had a BEE PMS condition. The scattered brood remains on both sides of two frames suggests PMS – a spotty (snot) brood situation MIGHT have been diagnosed in the October examination, but this requires a close examination of the brood; we might also have noticed evidence of too few adult bees to cover the brood – both are subtle clues of PMS in a Fall colony.

The fist-sized brood area, one frame over from the other two frames with scattered brood, might have been bees trying to escape the high mite numbers and dying, unhealthy brood of the two frames with scattered cells. Adult bees were likely dying prematurely from their mite and/or virus infestation and abandoning their (unhealthy) hive, thus the reason we saw only a smallish number of dead adult bees. The colony likely failed to rear sufficient fat, Fall bees.

The colony probably died within a month after the last October inspection, probably from a virus epidemic related to the mite infestation. NOTE: The September mite sample is misleading/confusing (we would expect it to have been higher); if an additional sample was taken it would perhaps have been higher? We might surmise that one or more colonies in the area had high mite numbers (see description of 2nd deadout below) and thus colony mite numbers could have increased rapidly in the Fall.

The apiary had heavy yellow jacket predation, something beekeepers cite as "cause" for colony loss. These scavengers however find and exploit weaker colonies and are likely more a secondary factor in colony demise.

Spring deadout

The second deadout was a more standard necropsy. Hive was a spring split from a strong overwintered colony in which a mated queen was added. Colony struggled all season; again a demonstration of the value of keeping good hive records. In the fall, colony consisted of two shallows. Colony had a 19 mite count (6%+) in early September after which it was treated with two formic pads between the two boxes. It was alive in mid-March (Spring 2018) but again noted as small with little food (i.e. capped honey or cells of pollen). It was fed dry sugar directly on the top bars on paper (some sugar was still remaining in mid-April – see photo 4) and provided with a frame of hard sugar candy, immediately adjacent to the brood.

Opening the top and removing the moisture trap, (many Oregon hives and all hives in this apiary had Vivaldi moisture trap/quilt board at top) showed a dead cluster of adult bees on three frames at top of the top box extending down about ½ way on the three frames (see photo 4; hive tool is showing the remaining dry sugar on paper – quilt board moisture trap with wood shaving on ground in lower right of photo). The adult bees were wet, black and showed excessive moisture; there were many maggots (scavenger fly) feeding on the dead bees. The dead queen was found among the dead bodies. See Photo 5 for closer view of one of the three frames with dead cluster.

There was capped brood in compact pattern at margin of the cluster on all three frames. The cells in center of the clustered bees all contained bees, head first (butts out) in the cells. The dead adult population was small (perhaps 8-10,000 bees). There was NO capped honey in any of the frames of either box. Lower box was empty. There were some dead bees on solid bottom board. There was little mold.

So what was diagnosis of this 2nd deadout examination? The dead cluster is characteristic of a colony that overwintered the tough, cold, wet Winter months (December-February). Moisture of adult bees, maggots and

little mold suggests recent death, confirmed via the mid-March hive journal entry. The compact brood shows the colony was starting to expand in the Spring (flight was noted in March). Although dry sugar (as candy and crystal sugar) was given as emergency feed (hefting would have revealed lack of enough stores), it turned out to not be enough – colony likely starved.

The dry feed (dry crystallized and hard sugar candy) confuses this diagnosis. I believe there might have been too small a cluster to generate enough heat to make slurry out of the dry sugar/hard candy, so bees couldn't use it. Photo 5 shows close up of one of the three frames with the dead clustered bees, "bee butts" in cells under the dead cluster and compact capped brood.

Season colony loss autopsies

When colonies have a queen replacement event they can end up queenless for a variety of reasons. Queen replacement is risky behavior. We will see this as a dwindling colony, perhaps even as laying worker condition. For a short while we can confirm queen event by seeing the cut back remains of queen cells. But colonies can be weak for any number of reasons, witness the struggles the Spring deadout had during the season. Feeding syrup, protein and later uniting the weak colony to a stronger one might have improved the chances of it surviving (take Winter losses in the Fall).

Colonies may swarm late in the Spring/early Summer or abscond and we might find a dead (or weakened) colony in early Fall as we begin to assist colonies with Winter preparations. Absconding is the behavior of bees (and queen) leaving their hive during the Summer due to several possible number of reasons. High mite numbers and BEE PMS are two likely reasons for September and October "swarms" – in reality an unsuccessful attempt by sick, stressed colonies to find an alternative home.

Disease may weaken colonies but, with the exception of viruses, are unlikely to kill a colony. Unless dequeened (for example chalkbrood, EFB) the disease may reappear in the Spring and result in slower colony development and Spring expansion. American foulbrood may eventually result in a dead colony but it often takes more than a single season. AFB, like mites, can be treated when discovered but sometimes we do not get proper diagnosis until it is too late to effectively rescue the colony; unfortunately such colonies become targets for robbing and the disease/mites spread to otherwise healthy colonies.

Pesticides remain a factor in dead colonies. At one time acute pesticide kills could be diagnosed by finding large numbers of dead foragers immediately outside (sometimes inside) the colony and dying neglected brood from lack of adult care. Determining if a pesticide might be a factor in a dead/weakened colony is more difficult today. Newer pesticides are more likely to affect adult behavior, shorten adult life and cause loss of one or more brood generations. Damage may not be acute but rather expressed as chronic damage, negatively impacting a colony long term. Placement of colonies near certain crops will risk the possibility of pesticide losses or weakening of colonies.

In late Summer/Fall we increasingly hear of colonies similar to Deadout #1 described above. Colonies that are apparently healthy and developing normally during the season quickly go downhill. In the Fall they fail to rear sufficient healthy bees to overwinter. The number of mites, but more likely, the presence of certain viruses in the apiary, such as Deformed wing virus (DWV), *Varroa destructor* Viruses (VDV-1) and one or more of the paralysis viruses (CBPV, ABPV, Kashmir Bee Virus (KBV) result in an epidemic. As in human flu viruses, bee viruses results in rapid loss of a colony. Analysis of viruses is expensive and not widely available so we are left to attempt to control the vector, the *Varroa* mite, as our best control option.

Failure to adequately control mites remains our number one factor in Fall and overwintering bee losses, in my opinion. It is a tough condition to adequately diagnosis, as shown in first deadout necropsy described here. But we should seek to make such a determination – it won't help the dead colony but it could help us help our bees in a subsequent season to a better survival rate.

Postscript

The equipment from both Fall and Spring deadouts are likely OK to reuse. All frames, except one with high number of drone cells, could be reused for a new colony installation (package/swarm/ split). Brush off dead cluster from the three frames of the Spring deadout. There is no easy way to remove the dead bees within the cells and from bottom board. If inclined, wash mold with bleach or vinegar solution. When using the equipment for a new colony, initially use only some of the deadout frames, adding the remainder as the colony gets stronger. BC

Spring deadout autopsy. Show is adult bees in tight cluster, extending over three frames. At back corner (below hive tool) is dry sugar that was not utilized. (photo by Deb Caron)

Close up of frame with dead bee cluster mid-April. This colony survived the Winter but most likely starved when they could not use the dry sugar or hard candy emergency feed. Capped brood (lower margin) is evident, cells above capped brood were filled with adult bees, head in. There are no cells of honey nor pollen. Fly maggots were extensive among the wetted dead adult bees.

From The National Agricultural Genotyping Center

Peter **Snyder &** Kim **Flottum**

Last September we published an article on this operation. If you recall, NAGC honey bee research and assay development was undertaken with the financial assistance of the National Corn Growers Association and of the North Dakota Department of Agriculture.

The full disease panel includes testing for:

- Acute Bee Paralysis Virus
- Black Queen Cell Virus
- Chronic Bee Paralysis Virus
- Deformed Wing Virus
- Israeli Acute Bee Paralysis Virus
- Kashmir Bee Virus
- Lake Sinai Virus 1
- Lake Sinai Virus 2
- Slow Bee Paralysis Virus
- American Foulbrood Bacteria
- European Foulbrood Bacteria

The NAGC tests are highly specific because the assays are designed to identify the target diseases at the molecular level. Each of the 11 diseases has a specific genetic code that ourhighly sophisticated instruments can detect.

Curious, I recently went back to see what kinds of issues, or non-issues they were finding, and if their work was helping those beekeepers who submitted samples to be tested.

I asked Peter Snyder, Lab Leader how things were going, and he sent along the past two year's worth of data they had collected. Had beekeeper's paid for all this I asked?

The answer to this question is yes, and no.

Yes, approximately 380 samples were submitted by beekeepers in 2016 and 2017 who paid the fees found on our website: full panel diagnosis (11 pathogens) cost $75 for an individual colony and $50 per colony for bulk shipments of 32 or more colony samples. We can also test for individual diseases at $20 per disease in a single colony, but we are strongly urging beekeepers to not go this route. It really isn't saving them money in the long run. For example, a couple of weeks ago a beekeeper sent us samples from three colonies to test for Black

Table 1. Summary of the number of colonies where each pathogen was detected in U.S. beekeeper operations in 2016 and 2017. The pathogen panel detected Black Queen Cell Virus (BQCV), Chronic Bee Paralysis Virus (CBPV), Deformed Wing Virus (DWV), Lake Sinai Virus 1 (LSV1), Lake Sinai Virus 2 (LSV2) and the bacterium, *Melissococcus plutonius*, the causal agent of European Foulbrood (EFB). Also given are the average number of pathogens per colony and the number of colonies sampled within each group or U.S. state.

Year	U.S. States	No. Pathogens/Colony	BQCV	CPBV	DWV	LSV1	LSV2	EFB	No. colonies
2016*	MO, MN, ND, NY	1.49	46	3	91	121	23	98	322
2017	ND	1.06	82	18	167	83	7	65	400
2017	PA	1.56	5	0	30	15	0	6	36
2017	MO	1.38	0	1	6	10	3	2	16
2017	IL, IN, ME, OH, WI	0.75	2	0	1	1	1	1	8
Combined Totals	**10 States**	**1.25**	**135**	**22**	**295**	**230**	**34**	**172**	**782**

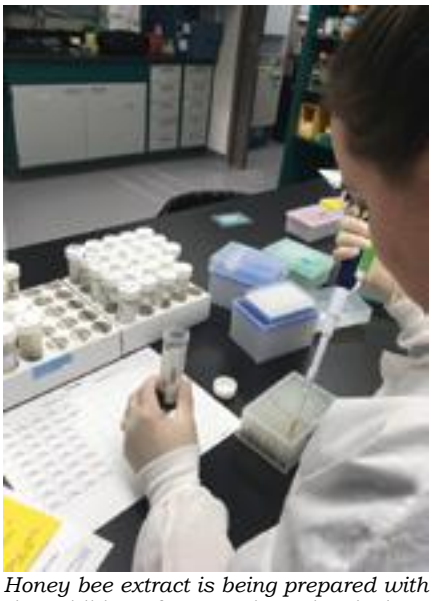
* No. of colonies tested in each state: MO=33, MN=1, NY=5, ND=283

Table 2. Summary of the number of distinct pathogens detected within each honey bee colony from private apiaries in the U.S from 2016 and 2017.

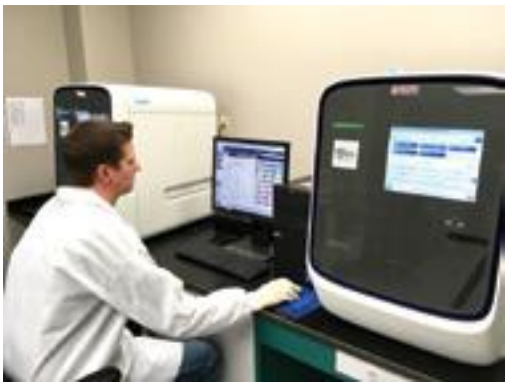
Year	U.S. States	No Pathogens Detected	1 Pathogen	2 Pathogens	3 Pathogens	4 Pathogens	5 Pathogens	No. Colonies
2016*	MO, MN, ND, NY	85	124	75	30	7	1	322
2017	ND	130	149	90	31	-	-	400
2017	PA	4	12	16	4	-	-	36
2017	MO	2	7	6	1	-	-	16
2017	IL, IN, ME, OH, WI	3	4	1	0	-	-	8
Combined	**10 States**	**224**	**296**	**188**	**66**	**7**	**1**	**782**

* No. of colonies tested in each state: MO=33, MN=1, NY=5, ND=283

Honey bee samples are received and tracked separately at each step during the 11-disease panel analysis using a Laboratory Information Management System (LIMS). The LIMS is also able to send a report to the beekeeper who sent in the sample after the entire process has been completed.



Honey bee extract is being prepared with the addition of appropriate chemicals to create a solution that can be analyzed. Each container represents one sample that was submitted to NAGC for analysis; each typically representing one hive.



The honey bee solution is placed inside highly sophisticated instrumentation for High Resolution Melt analysis. Identification of the target diseases is achieved by analyzing the signals, visualized as peaks, on the computer screen.

Queen Cell Virus based on a visual diagnosis. The report came back negative. So the beekeeper is out $60 and still doesn't know what was wrong. Full panel screenings are essential.

And no, the 400 colony samples from North Dakota in 2017 were done in cooperation with and paid by the North Dakota Department of Agriculture, Apiary Program.

The data Peter sent is summarized in these two charts

He then sent along some photos describing the process.

Finally, he added a summary bullet point section.

Honey Bee Summary Data

- The not-for-profit National Agricultural Genotyping Center (NAGC) tested a total of 782 colonies across 10 U.S. states from 2016 to 2017. Summary of pathogens detected is given below in Tables 1 and 2 with each year separated as well as combined numbers. While NAGC officially tested 782 colonies for case work, the validation required approximately 7,000 standard specimen tests (non-probative samples). In other words, NAGC performed thousands of honey bee pathogen tests.
- Of the 782 colonies tested, only 28.6% had no pathogens detected, one pathogen was detected in 37.9% of the colonies tested, and 33.5% of the colonies tested had two or more pathogens detected. For this reason, NAGC strongly urges beekeepers to do a full-panel pathogen molecular screening, and not rely on visual diagnosis that can be incorrect.
- In terms of published studies, NAGC has tested one of the largest number of colonies within a single state over a two-year period (North Dakota; n = 683). [The National Honey Bee Disease Survey (NHBDS) only samples 24 colonies per state each year since 2009. For example, NHBDS sampled 24 colonies within each 41 participating states in 2017.]
- NAGC is monitoring for a disease that has not yet been confirmed in U.S. honey bees – Slow Bee Paralysis Virus.
- NAGC continues to monitor for other pathogens, that have not yet been confirmed in its tests, including: Acute Bee Paralysis Virus (ABPV), Israeli Acute Paralysis Virus (IAPV), Kashmir Bee Virus (KBV), Slow Bee Paralysis Virus (SBPV), and American Foulbrood (AFB).
- NAGC tests for pathogens that NHDBS does not – LSV1, EFB, and AFB. NHBDS does test for LSV2, however they also stopped testing for BQCV in 2013 because of its ubiquity (>90% of samples tested in 2012-13 collection year).
- Detection and differentiation of AFB and EFB is critical with the new FDA regulations of antibiotic use for beekeepers, which now requires a prescription from a Veterinarian. Thus, detecting colonies that are subclinical can help with management of these two brood diseases.

NAGC is a not-for-profit laboratory that makes its diagnostic services available to both commercial and hobbyist beekeepers. For more information on the testing services, check the NAGC website at www.genotypingcenter.com.

I think this summary information is critical to beekeepers wanting to know for certain what their bees are dealing with, and, if possible, how to care for them. BC

Delphos Bee Veil with one ring

Is There A Proper Way To Wear A Bee Veil?

Jim **Thompson**

Sometimes you see things that are very funny and you break out laughing even when it is really a serious situation. I was at a beekeepers field day and there were so many people there that we were divided into three groups. I was listening to what the speaker of our group was saying when I received a nudge from a friend standing next to me. He pointed to one of the other groups. What did I see? There was a beekeeper putting on his "new" veil. The veil was one of the slip-on jackets with the veil attached. The beekeeper had slipped on the veil, but had gotten it backwards. Here he was starring at the white protection backing that would keep the bees from stinging him in the back of neck. I can imagine that what he was seeing would be like looking at a blank movie screen. He had discovered that the veil was on backwards and so was tugging at one side of the veil and it just wouldn't move. After three or four tugs and changing sides of the veil, he decided that he should take the veil off and put it back on because his arms were preventing the veil in turning. So he attempted to correct the situation, only to get the veil back on in the backward position. He then attempted a third time to get the veil right and was successful. However there were about a half a dozen or more of us in the other group that were amused. In fact, I had a friend in our group that always has a camera with him and he sent me a picture of the situation. However over the years that photo has gotten lost and it wasn't that clear as it was taken from about a half block away.

I don't know if slip-on bee jackets have a little tag that is similar to the one used by the shirt manufacturers. The tag is sewn on the inside left seam. But if they do, it lets you know when the garment is inside out and the front is oriented correctly. Otherwise, you may find it difficult to put anything in your vest pocket. When you see that tag, remember left is right. If you have a zipper model, it is very difficult to get those on backwards.

If you asked my opinion, that beekeeper had purchased the right type of veil. There are no drawstrings to come loose and when you lift heavy supers, they can rest on the jacket instead of messing up your shirt.

Many companies try to sell you entire bee suits. The suits are available in an assortment of fabrics and colors. You might even try on a suit while you are in the store. Yep, yep you normally would wear a large and the large suit fits nicely over your clothes. You buy it and go home a happy camper. The nice warm day when you first try out your new suit comes and you discover that, golly it gets hot in there. It is not hard at all to work up a sweat, so maybe unzipping the suit a little will cool you off. In the back of your mind you think, Maybe next time, I'll wear just underwear under the suit. Then a little bit of reality sinks in. Where are you going to change? When you get home and try to get out of the suit, it seems to have shrunk or it is stuck to your clothing. Gosh this is hard to get out of. You wish that you were double jointed. Perhaps you should have purchased a larger size.

There are tie down veils that a person can buy. Did you ever notice that the people that make veils now days must have never been beekeepers? Some veils have a taper to them so you can tell which side is front. Likewise the skirt has a taper to it so that it is even at the bottom. On the bottom of the skirt the fabric is folded over making a tube for the draw string. The drawstring is fastened at the rear of the veil and the ends come out at the front of the veil. Oh, it looks nice! How in the world are you going to tie it down to keep the bees out of your face? You could pull on the drawstring and close the gap, but that is like tightening a tourniquet on your neck. Some manufactures put elastic along the bottom of the skirt.

It wasn't always like this. As early as 1918, the Indestructible Veil had the tie down with two rings on an elastic strap. By 1924, the Tulle Veil, Alexander Veil, and the Delphos Veil had the double rings. But in 1973, someone changed it to a single ring. Perhaps it is it was cheaper to have only one ring or maybe it is more fashionable. Beekeepers don't

Delphos Bee Veil with two rings

need to get samples to their mouths anyway. The veil manufacturers aren't wearing the veils anyway and running the risk of having puffy or swollen eyelids.

In order to wear a tie down veil, most of them will need to be modified back to the early standards. The tie down string needs to anchor at the rear of the veil's skirt. The length of the string depends upon the stature of the beekeeper. I like to use two rings on a short piece of elastic. This allows the veil to stretch for honey samples without taking off the veil. The length of each string is figured as coming from the anchoring point down to a belt loop or around the belt and up to the front ring. From the front ring, the string goes to the beekeepers back and ties with the other string from the other side. Too much string gets in the way and a short string means that you have to figure out a different way to anchor the veil. If you can't find two small rings, a safety pin will work but it frays the string.

Of course you could work your bees without a veil, but I would not recommend it. An unhappy bee usually gives you a couple of warnings before she stings you. The first warning is where she flies back and forth in front of your face making all kinds of buzzing sounds. The reason that she flies there is that she is zeroing in on the carbon dioxide that you exhale. If you ignore that warning, the next one is where she flies and bumps in to you as though she was blind. She really isn't blind; she was warning you that you are in her space. Failure to heed these two warnings, results in a quick sting.

Stings to the face can be painful and sometimes cause permanent damage. I believe that most painful sting that I ever had was between my nostrils. BC

References:

Various bee supply catalogs from 1918 to 1973.

Vacation Time!

Ann **Harman**

It's the middle of Summer now at our cottage in the village in Northamptonshire. Remember we were there in June. Since the bees have plenty of food and a water source it would be a good time to visit beekeepers in other areas. The vacation trip will begin by driving into Scotland then a ferry trip over to Belfast in Northern Ireland, then down south into the Republic of Ireland, finishing with taking a ferry over to Wales, then finally back to the cottage. Plans are to visit some local association meetings and perhaps some conferences.

The Scottish Beekeepers Association, SBA, was founded in 1912 and today represents 1500 beekeepers. However there are 40 local beekeeping associations in Scotland, all affiliated with SBA. Membership dues in SBA have seven different categories, including for-profit and for-non-profit organizations. A discount is given for a new member, and a reduced fee for Junior membership. Many of the local associations offer beginning beekeeping classes.

Members automatically qualify for an Insurance and Compensation Plan. The first 10 hives of a full member are covered free against loss from fire, theft, vandalism and AFB/EFB diseases if the colonies are located in Scotland. However, if the beekeeper makes repeated requests for compensation without taking action, they may be excluded from compensation.

The Scottish Beekeeper is the monthly magazine distributed to all the members. Articles are written by SBA members but also come from other sources. SBA announces workshops that will be given. There will be one in August on Honey Processing. The SVA also has a shop. You can buy shirts and jackets with the SBA logo and also a patch of the logo to put on other articles of clothing. You can select a book from a nice collection for sale. You can also purchase the Study Notes for the BBKA Exams. The examination system is identical to the BBKA program. Information on examinations, the deadlines for application to take exams and workshops can be found on the SBA website.

The SBA has access to a large private library of beekeeping books and periodicals that are available to fully paid-up members. Although this library, the Moir Library established in 1912, is kept at the Fountainbridge Library, members do not have to travel there since the library has various means of distribution. The Moir Library Rare Books Collection is kept at the National Library of Scotland. Here you will find beekeeping books published before 1801, along with a few published a little later.

Honey Shows are an important part of beekeeping here in Scotland. The first big show of the year is the Royal Highland and Agricultural Society Show from June 21 to 24. The Honey Show part is in association with the Scottish Beekeepers Association. There are 50 open classes; the 51st class is only for a display done by a local association. The list of classes is impressive: honey, beeswax, mead and one for a honey cocktail (alcoholic or not), displays, gifts, labels and crafts. Classes for Juniors and one for schools are offered. The classes for honey cookery are interesting. Recipes are given for each type of food. You must use the stated recipe to enter the listed class. Quite a few special awards are given at this show. The Honey Marquee has educational displays as well as honey tastings. The honey cocktails are not included in the tastings.

At the end of Summer the Dundee Flower and Food Festival is held, August 31-September 2. This year is its 30th anniversary. This festival features horticulture and food with a craft fair, cooking demonstrations, and many competitions. The Honey and Beekeepers Section is divided into two competitions. The Honey Section uses the Rules of the East of Scotland Beekeepers. There are 14 classes for honey and beeswax plus five Novice classes. In general a novice is one who has not won a ribbon in a major show. The Beekeepers Section is the Open Scottish National Honey Show. Classes include honey, beeswax, photography, displays, products, mead and cookery (using the recipes given). And, of course, classes are listed for Junior and Novice.

Now it is time to take a ferry across to Belfast, in Northern Ireland.

One association is the Northern Ireland Beekeepers Association (INIB) established in 2001. The newsletter has a number of articles and will be giving the date of the 15th Annual Conference and Honey Show that will be held in October. Full membership in INIB gives its members automatic membership in the British Beekeepers Association (BBKA). Members will receive monthly copies of BBKA News and six e-newsletters.

The Mayo Beekeepers Association is a local association that focuses on beekeeping in the west of Ireland. Meetings are held each month and feature lectures, demonstrations and a library. A beginning beekeepers course is offered. The Ulster Beekeepers Association is quite active with programs and beekeeping courses throughout the northern area, as well as a honey show.

In the visit to Northern Ireland and through the Republic of Ireland the Federation of Irish Beekeepers Association. FIBKA, is active. The Federation has a number of affiliated local member associations. Each of these associations has its own programs of events, lectures and demonstrations. Many of them give beginning beekeeper courses. FIBKA has a monthly magazine, *An Beachaire*, with articles relevant to Irish beekeeping. An annual Summer Course has been held at Gormanston since 1961. This year it will be in August, the 12th to 17th.

In addition to the course, with programs covering from beginner to advanced, there will be workshops, demonstrations, examinations and the National Honey Show. The practical workshops, on a number of topics, will include ones for encaustic art and cooking with honey. The course is internationally known, with participants coming from around the world.

Ireland's beekeepers are enthusiastic about beekeeping. Several other associations are present throughout. The newest one, Irish Beekeepers' Association CLG was formed in 2017. This association accepts individual members and does not have affiliated associations. At present, because of its recent organization it is still small in membership.

Another small association is called The Native Irish Honey Bee Society (NIHBS). Its members promote the native Irish honey bee, *Apis mellifera mellifera*, a dark bee. A focus of this association is to support research, especially in universities, on specific genetic markers found in this bee. *Varroa* resistance, or tolerance, is also a part of the research. One other small association is the Irish Buckfast Breeders Association (IBBA) that promotes keeping the Buckfast bee.

After being busy with beekeepers and beekeeping associations in Ireland it's time to get on the ferry for a short trip.

Now here we are in Wales. The Welsh Beekeeping Association (WBKA) was established in 1943. Today there are 19 local associations affiliated with WBKA. Although individual membership is possible, that membership is primarily for organizations and businesses. You indirectly become a member of WBKA by joining your local association. WBKA has 1700 indirect members. *The Welsh Beekeeper* is the organization's quarterly publication.

Welsh beekeepers are quite busy with events throughout the year. A special one, to celebrate the 75tth year of WBKA in 2018, will be a Convention from July 13 - July 15thwith lectures, workshops and some social events. Saturday evening will be the Gala Dinner. The annual WBKA Convention was in March on Saturday the 24th. The Welsh National Honey Show is held at the main agricultural show, the Royal Welsh Show, from 23rd to 26th July. In the honey show 75 classes are scheduled for honey, honey products, wax and mead. Some classes are especially for Junior beekeepers. In addition to this national show, there will be the Conway Honey Fair on September 15. You will find beekeepers taking part in two other agricultural events. The Spring Festival from May 19-29 is called a celebration of small holdings and rural life. Then, in anticipation of Christmas, the Winter Fair, one of the several yearly agricultural shows, will be November 25-26. Honey and other hive products would certainly sell very well at that time of year.

Now it is time to end the vacation trip. Visiting the beekeepers, attending a number of local meetings plus some special events shows that the beekeepers in this part of the world are enjoying their honey bees and taking good care of them. BC

Ann Harman has been all over the world visiting different beekeeping groups. She makes her home in Flint Hill, Virginia.

CALENDAR

♦INTERNATIONAL♦

Propolis In Human & Bee Health will be held September 28-29 at the Park-Hotel, Moskva, Sofia, Bulgaria.

For more details, registration and abstract submission visit **www.propolisconference2018. cim.bg**.

Cuba Beekeepers Tour 2018 will be November 10-18.

Featured will be visits to apiaries, queen rearing, processing plants, research centers and more.

For more information please contact Benita Lubic CTC, President, Transeair Travel LLC, 2813 McKinley Place NW, Washington, DC 20015; 202-362-6100, 202-362-7411 Fax; **blubic@aol.com**

♦CONNECTICUT♦

Back Yard Beekeepers – each month hands on inspection workshops, bee school, mentor program and more.

Speakers include September 25, Richard Coles; October 30, Dewey Caron; November 27, Bill Hesbach.

For information **visit www.backyardbeekeepers.com**.

♦GEORGIA♦

Georgia Beekeepers Association Meeting will be September 27-29 at the Forsyth Conference Center in Cumming.

Keynote speakers include Maryann Frazier, Jerry Hayes, Izzy Hill, and Julianna Rangel. In additional there will be a catered dinner with guest lecturer, 12 breakout sessions covering a wide variety of topics. We will have our annual honey show and a large grop of beekeeper suppliers.

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

♦MASSACHUSETTS♦

Mass Bee Fall Meeting ill be November 17 in Bristol County.

Speakers are Jamie Ellis and Sam Ramsey.

For information visit **www.massbee.com**.

♦NEW YORK♦

Understanding and Meeting Your Bees' Midsummer Needs July 28 at the Pfeiffer Center in Chestnut Ridge.

For information visit **www.pfeiffercenter.org or contact info@pfeiffercenter.org**.

♦OHIO♦

Lorain County Beekeepers, Fall wrap-up, September 7, speaker to be announced.

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

Nightmares of a Newbee

The monsters that haunt our dreams
Are made not of tooth and claw
But scuttle through the honeycomb
of our unconscious
On six legs, or none at all.

Destructor, hive beetle,
The elements themselves.
Too much rain, not enough.
Nature chains us to her whims.

Up all night, sleepless
Like the colony. But they work
While you worry. Peace of mind has
Absconded. Will the bees follow?

Peter Keilty

2019 Bee Culture Calendar Contest

Don't forget the 2019 *Bee Culture* Calendar contest! The topic is All Things Royal – Queens! Retinues, laying eggs, emerging from cells, being fed, Mating – that would be a sure one, as would a drone comet with a queen in front, queens fighting, anything and everything queens, queen banks, queen cells, grafting queens, caging queens, holding a queen in your hand, marking queens. If you got a queen you got a picture. All Things Royal. Don't forget! Send your photos as JPG attachments in an email, only 1 per email, to **Kim@BeeCulture.com**. If your photo is too large it won't come through. We will respond if we get your photo. If you do not hear back from us we did not get it. Reduce the size/resolution and send again.

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Can't Find The Time

Ed **Colby**

I don't know if I've successfully managed to "let go" of my honey bee obsession, or if the little darlings have simply buried me. I suspect the latter.

I don't really have any competing interests. It's not like I got the apples or the grapes pruned here on the farm, or planted a garden. I used to, but either the gal Marilyn does that stuff, or it doesn't get done. I never go fishing anymore.

My queens arrived in three shipments of 30 each, from early April until early May. I split my hives and place a new queen in each queen-less split, or I pull four or five-frames out of a hive, put them in a box with a new queen, and call it a nuc. That's how I use up 90 queens on 125 colonies. Only rarely do I re-queen colonies that already have one. Established two, three and four-year-old queens work fine for me. I let 'em do their thing. That might not be the best way to keep bees, but it's my way.

So, 125 hives, 90 new queens that go into splits or nucs. That's over 200 Spring colonies, and a lot of new blood. The splits hopefully grow up to be double-deep hives with lots of honey supers stacked on top. The nucs generally get put into queen-less colonies.

Once your nucs are queen-right and prospering, you can periodically remove bees and brood to keep these mini-hives from getting too crowded and swarming. That way you have a supply of easily transported queen-right colonies that you can use to introduce a queen into a hive that needs one. I don't use newspaper or fret about queen acceptance. A nuc inserted into the middle of a queen-less hive works like magic.

Splitting hives and pulling nucs out of established hives is a strong disincentive to Spring swarming. Once crowded bees start filling the brood chamber with honey, in other words, putting honey into the normally empty cells in which the queen lays her eggs, swarming's probably unstoppable, and that's my problem here in the merry month of May.

Splitting double-deep hives is a lot of work. I shake the bees from upper box hive down into the lower one, put a queen excluder on top of that lower box, and then put the top super (the one I shook all the bees off of) on top of that. That way, when the bees re-populate that top super through the queen excluder, I'm confident that the queen remains downstairs, and I can take the top super to a different location and put a new queen in it. Are you with me?

Bees hate it when you do this, and if you have any cranky colonies, they'll express their displeasure in a dramatic way.

Making nucs is a little easier, and it's less disruptive to the bees. I simply look for the queen on each frame of honey, brood, and bees as I pull it out of the mother hive and put it in my nuc box. If there are a lot of bees on a frame, I'll look again again after shaking them into a cardboard box. Then I dump those bees into the nuc box. Do I mess up occasionally and put the old queen in the nuc box? Of course. She'll probably kill the newly introduced queen, and the queen-less mother hive will just have to make a new queen. This is not the end of the world.

I have to get after it, because 30 queens won't live indefinitely in a shipping box. I could put the little darlings in a queen bank, i.e. a queenless colony of bees, but I hardly ever do this. If I give them food and, more importantly, water, they'll last a week or two in the box.

We had hot weather and a wicked dandelion honey flow right when I got tied up making the last of my splits. I'd already gotten a second (empty) deep super on my earlier splits, but the bees filled those up in no time flat. Pretty soon they needed honey supers. Where was the beekeeper? At another yard making splits. I didn't get my honey supers on in time, and now I've got swarm cells. How many? I don't want to think about it.

I know better, and it still happened. But it always stuns me how fast things change. One day you're feeding bees, and the next they're getting ready to swarm.

My pal Frank is a meticulous individual who cannot comprehend how I function in such chaos. He sometimes helps me move bees, so he knows how I operate. A retired cabinetmaker who takes pride in his attention to detail, he looks at my beekeeping operation and shakes his head.

I look at it this way. I could maintain 50 hives and probably stay on top of everything. I could even give them a fresh coat of paint. But I wouldn't make any money. Social Security plus 100 to 200 colonies pays my bills, even when things go wrong. So what if 20 or 30 hives swarm? I wish they wouldn't, but they do generally re-queen themselves and sometimes even make a honey surplus. If they bounce back, I can send them to California for the almonds. So what's the problem?

Frank and I go way back. We're in the Autumn of our years. Like queens in a box, we won't last forever. He lives to fish. I'd like to go with him, but I can't find the time. That's my real problem.

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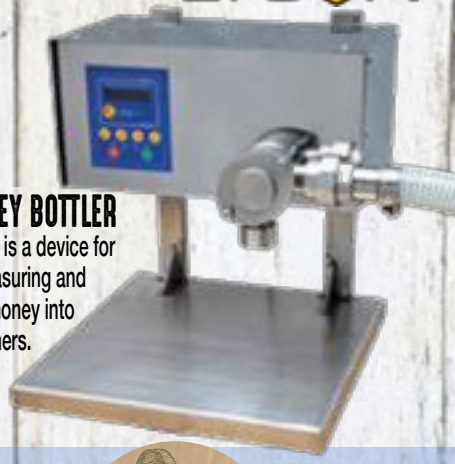

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