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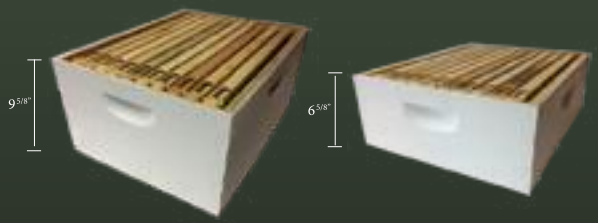

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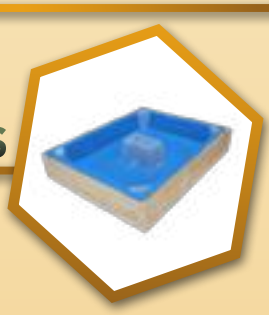

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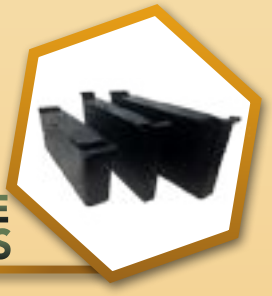

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Bee Culture

February Features . . .

Page 41

Page 66

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

Subscription Information
U.S., one year, $25; two years, $48. Newsstand price: $4.99. All other countries, (U.S. Currency only), $20.00 per year additional for postage. Digital Edition $15. Send remittance by money order, bank draft, express money order, or check or credit card. Bee Culture (ISSN 1071-3190), February 2020, Volume 148, Issue 2, is published monthly by The A.I. Root Co., 623 W. Liberty Street, Medina, OH 44256. Periodicals Postage Paid at Medina, OH and additional mailing offices.

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

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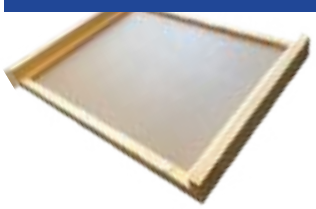

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Bee Culture's Best . . .

Page 70

In Every Month –

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Go With The Flow

I always enjoy *BC* articles that are founded on good science, years of experience and acute observation, but had to take issue with your December article: *Are You Listening? On Professionalism.*

While the article starts on target addressing marketing pieces that are presented as science-based and warning against "blatantly overstated promotions", I was surprised to see the author conclude that "a recent development called the 'flow hive' appears to fit the model described above."

I am curious as to what science, experience or acute observation the author used in making this statement. I've been a beekeeper for five years and one of my three hives is a flow hive which I have had for four years. Although it took a year and a half for my bees to really take to the flow hive frames, this year I harvested 30 pounds of honey from my flow hive directly into 30 1lb jars in a couple of hours without opening the hive, and without a bee suit. It was an absolute delight. I walked to the back of my hives with three cases of empty jars and returned to my home with three cases of honey ready for labels.

I spent the next two days harvesting my other two traditional hives in my bee suit, smoking, removing frames, brushing off bees, carrying frames to my garage, scraping off the cappings, centrifuging the frames two at a time, straining the honey to remove wax and bee parts, filling jars and then cleaning up the mess, with robber bees and wasps swarming around licking up the left overs.

I am committed to more natural beekeeping and have been working on disturbing the hives as little as possible. This year I didn't open the hives until harvest time, and the flow hive turned out to be my most robust and active hive. Now, that may just be a coincidence, but as we speak I am converting the supers in my two traditional hives to flow frames.

Pricey? Definitely, when compared to traditional frames. But, let me assure you that there is absolutely no comparison to the simplified, delightful harvesting experience the flow hive provides; and my bees thriving in that environment is proof enough for me to make the complete conversion.

I'm anticipating a 90 pound harvest next year, sitting behind my hives, without a veil, and never opening a super to harvest again. So far I've had two successful years of flow hive harvesting without a hitch.

If you want to receive feedback based on a couple of years' experience from this more than satisfied flow hive beekeeper, let me know.

-Danny Wells
Vacaville, CA

Author's Response: *Thanks to Danny Wells of Vacaville, California for the comment concerning what we published in "Are you listening; On Professionalism," December 2019: "While the article starts on target addressing marketing pieces that are presented as science-based and warning against 'blatantly overstated promotions,' I was surprised to see the author conclude that a recent development called the flow hive appears to fit the model described above. I am curious as to what science, experience or acute observation the author used in making this statement."*

Looking at the above statement closely, reveals that we may indeed have overstated the situation. We were forced to look at the flow hive from a human's point of view, something that beekeepers have done over the centuries in designing a large number of hives, as listed in the recent book: Variations on a Beehive, compiled by Patricia Nelson and published by Northern Bee Books in 2019.

That volume in fact contains what can only be described as a "love letter" to the flow hive by Lynne Ingram, which Mr. Wells seems to agree with concluding, "I've been a beekeeper for five years and one of my three hives is a flow hive which I have had for four years. Although it took a year and a half for my bees to really take to the flow hive frames, this year I harvested 30 pounds of honey from my flow hive directly into 30 1lb jars in a couple of hours without opening the hive, and without a bee suit. It was an absolute delight. I walked to the back of my hives with three cases of empty jars and returned to my home with three cases of honey ready for labels."

Unfortunately, many of the human-designed honey bee dwellings have not really focused on the benefit to ourselves, the residents of the nests described. In this context, we do view many advertisements in the bee journals as potentially "blatant and overstated." Thus, our counsel to beekeepers stands. We bees urge both honey bees and humans take a hard look at advertising in the beekeeping field, and cannot condone that a prominent disclosure clause is all too often lacking.

Fainting Queens

Many years ago while attending the Los Angeles County beekeepers club annual picnic I had a chance to demonstrate queen marking.

No fancy marking tube devices had been invented at the time. So I brought an unmarked queen and began to mark her. No marking pens existed at that time in the 1970s. If they did we did not use them. What was available at that time was a small bottle the size of nail polish, from Los Angeles Honey Co., with a stem in the lid missing a brush.

Worked great. So when it came time to show off my prowess marking queens I did so only to have the queen "faint." In my not so humble opinion queen fainting is a more appropriate description of what sometimes happens when you handle a queen. It happens now and then to this day, even in the marking tube!

I panicked and thought I'd killed her. Expressing my dismay a

senior beekeeper put his hand on my shoulder and exclaimed: "she just fainted son."

"Give her a few minutes and she will recover", which she did and I got her back into a wooden Benton queen cage.

W. Montgomery
Southside, AL

Best Friends

I want you to know that I enjoy reading the 'Summers Time' column. I have been keeping bees and poultry since the early 1980s.

I have raised lots of birds in this time. I thought that you might like the story behind this photo.

The dog was a half Pyrenees, half Great Dane that was the finest guard dog. She protected our poultry from predators. The duck was part of a bantam assortment. I kept a pair as pets. Her mate was lost after about a year and she took to the dog for friendship. She hung out with the dog and slept with dog. Even after I got more ducks she never would associate with them. She preferred the company of the dog. She would come when I called her and would eat from my hand.

At first the dog really didn't care for her company but as time went by they became pals.

Buster, the dog lived to be 13 years old and the duck was killed by an owl at 12 years. This happened a short time after the death of buster. Her protection was gone.

Keep writing about birds and such. I enjoy it tremendously.

Mark Mahlberg
Wray, CO

Thank You Vermont

I live in Louisville, KY. I've been in bees since 1978. I use Russian queens. They are good for honey and are not mean.

I have not treated for about seven years.

Thank you Vermont for your queens. Why would anyone treat bees if you need gloves and a respirator. Think what it would do to the queen's ovaries. If you need to wear things like this what would it do to your bees?

Donal Fradet
Louisville, KY

Darwinian Beekeeping

I'm writing in response to Ed Colby's article in the Bottom Board of December's issue of *Bee Culture*.

I'm sure that Dr. Seeley is having a nice chuckle after reading Mr. Colby's half baked dismissive assessment of Darwinian Beekeeping. I was wondering how long it would take for mainstream beekeeping to ridicule the methods and purpose of natural beekeeping. I'm a relative newcomer to beekeeping having only kept bees for about 10 years. Fortunately I have been privileged to participate in teaching the new hoards of Beekeepers in our area of Charleston South Carolina and find that most could care less about how much honey they get from the "squirrel cage" but instead want to have their gardens pollinated and help stop the decline of all pollinators and many other reasons. The methods of Darwinian Beekeeping are perhaps not suitable for our animal husbandry fleet of commercial Beekeepers but more and more are employing some of these principles and enjoy 80+ percent survival rates while remaining treatment free. Very similar to Dr. Seeley. We should never teach our new Beekeepers to use Langstroth thin walled designs. Even Langstroth warned against it. We should never teach them to cluster their hives closely together or to prevent swarming. And the list goes on. As the saying goes, " if you keep doing what you've always done, you'll get what you've always got!" Unfortunately I don't hear or see a lot from the beekeeping establishment

about Beekeepers changing their methods or equipment, we continue to only blame pesticides, fungicides, herbicides and Varroa for Honey Bee declines. I hope that the distinguished Beekeepers and scientists representing and writing for *Bee Culture* will begin to recognize the new legions of Beekeepers who desire to learn about a more bee friendly approach to beekeeping.

In November of 2019 Dr Seeley and Dr Leo Sarasakin came to Charleston to address about 300 Beekeepers from around the USA. The conference was hosted by our local association, Charleston Area Beekeepers. I was honored to spend a good deal of time with both after the conference and very much enjoyed Dr. Seeley's kindness, gentleness and thorough responses to every question. I firmly believe he is shining a light on a path for Beekeepers to follow to vastly improve their skills in interacting with Honey Bees. I don't claim to be much of a Beekeeper, more a nuisance that my bees seem to tolerate. They certainly don't need us to care for them but I would like to find a better set of principles and equipment that will at least give them a chance to survive. There are many Arnot Forests around this great land and many colonies of wild bees locally adapted for Beekeepers to provide a suitable home for. What have you got to lose, put out some swarm traps this spring and begin your own Darwinian Beekeeping.

Larry N Haigh
Mount Pleasant, SC

A 4.5 Million Dollar state of the art Honey Bee Lab, dozens of grad students over the years, a series of beekeeping videos, hundreds of talks here and overseas, many Federal and independent honey bee research projects and much, much more making Dr. Jamie Ellis at the University of Florida a respected and trusted Beekeeper Scientist.

Approximately 14 years ago when I was the Chief of Apiary Inspection for the Florida Dept of Agriculture and Consumer Services, the Florida State Beekeepers Association and individual beekeepers convinced the Univ. of Florida that filling a vacant position for a focused Honey Bee scientist was a Florida industry need. I was one of those selected to participate on the search committee. We had many outstanding candidates to choose from. After several weeks and lots of interviews and presentations by chosen candidates Dr. Jamie Ellis was selected. My office was within walking distance of the Entomology and Nematology building where the office of Jamie was located. I remember my first spontaneous visit to him in is new office. OMGosh . . . I was surprised and a bit taken back by his assigned 10' x 10' office space, a desk, phone, filing cabinet and a desk lamp as his start. But, none of this really concerned Jamie. His goal was to help beekeepers and he knew if he did that it would all be OK. I had the opportunity to get to know Jamie better over the years as he moved forward fulfilling his goal to help beekeepers and as we worked together and shared resources at times to move information and educational outreach to Beekeepers. I wouldn't have taken the time to interview Dr. Jamie Ellis if I wasn't impressed with all he is and has done. Take a few minutes to read about Jamie.

JH – Tell the story about how you became interested in wanting to have honey bees. I think you had a dream when you were six or seven years old if memory serves me correctly.

JE – Jerry – my earliest memory is that someone (a beekeeper I guess) came to visit our class when I was in Kindergarten or 1st grade. I remember getting a brochure on beekeeping that he passed out to the students. That brochure went into my toy box and resurfaced every once in a while. Shortly thereafter (maybe within a few years), I had a dream about keeping bees, a bit out of the blue. After that, I noticed (again, as a young kid) that a house on my bus route had a beehive in its backyard. At that time, my little brain put everything together and I wanted to start keeping bees.

New University of Florida Lab. (UF photo)

JH – Then what happened? Did you keep the desire?

JE – From there, I pitched my interest to my parents, likely when I was around eight or so years old. They were supportive, but a bit reluctant since beekeeping wasn't in my family. I read up on bees for the next four years and at 12 finally got my first hive. That is a story in-and-of-itself. In 6th grade, I mentioned to my science teacher that I was interested in keeping bees. Her uncle was a beekeeper (in North Carolina I believe). She asked me that if she brought me an empty hive, would I promise to fill it. I said I would. Well, she showed up at my house some weeks later with an empty beehive. I just needed bees. My dad happened to work with someone at the time who had been a beekeeper in the past. That individual had a friend who was still a beekeeper. I was put in touch with him. He became my mentor. He passed away about a year after we met, and I inherited his colonies (around 15 or so). I kept bees from that point forward, even today.

JH – As you entered those college bound years what did you want to major in? Wasn't it entering the medical field?

JE – In middle and high school, I became very interested in 4-H and science fair. My projects were always bee centric. I was fortunate to be successful in various competitions with both groups and that really matured my interest in science. Also, during those years, I had met Dr. Keith Delaplane, bee scientist at UGA. My high school science teacher and I would bounce science fair projects off of him. He heard I was going to the University of Georgia, so he invited me to work in his lab as an undergraduate researcher. I took him up on that invitation and worked with him all four of my undergraduate years. Coming from a small town

and going to a small school, I had come to believe that medicine was the pinnacle of science. I thought all good scientists became medical doctors. Thus, I went to UGA with a plan to major in biology with a declaration in pre-med, given I had plans to go to medical school after graduating. However, I learned while working with Dr. Delaplane that my real interests were with honey bees. Seeing that, Dr. Delaplane suggested I just marry my two interests: honey bees and science. I followed his advice and did just that.

JH – Did your family swallow their collective tongues that you were not going to pursue a Medical degree and instead become a Beekeeper Scientist?

JE – I was pretty close to taking the MCAT (the med school exam) and applying for medical school. It's just that something didn't seem right at the time. All of my friends and even my roommates where studying for their med exams, applying for med schools, etc. Somewhere in there, I decided that I wanted a PhD working with honey bees. I've not looked back, neither have I regretted it.

JH – In this part of the life journey when and how did you meet Amanda, your wife?

JE – As you know, I happen to be a Christian. I have been since I was seven and my faith is even stronger today (even if I constantly fail to live up to Jesus' standard). While at UGA, I did some bi-vocational youth ministry work at the church where Amanda attended. Amanda was a freshman at UGA when I, a junior at UGA, started to work with the youth at her church. She helped out in various ways with the youth ministry and we just started dating. That was around late Summer 2000. We were married in March 2002 and have not looked back (we've not had time to look back given we now have four kids).

JH – Was she interested in honey bees or did she think you were an amazing unique person too?

JE – I think she was principally interested in science. Her undergrad degree from UGA is in wildlife biology. She likes the outdoors (and knows a good bit about trees, plants, wildlife, ecology, etc.). At the end of the day, I think it was all a "God thing" that we got together, have common interests, and happen to be very much in love (even today). She went on to get a MS in Zoology and a PhD in Entomology (honey bee pollination ecology). Even given that, I would not say her interest was in entomology specifically. She just happened to like all animals and already had two degrees that focused on mammals. So, she thought insects, well – honey bees, might be a nice intellectual pursuit. This, of course, was all after we met so I am sure her interests matured as she and I got to spend a lot of time together.

JH – What were your undergrad Degrees in?

JE – My degrees: BS biology from UGA, PhD Entomology from Rhodes University. Amanda's degrees: BS wildlife biology from UGA, MS zoology from Rhodes University, PhD entomology UGA

JH – You skipped a Masters and went straight to a PhD at Rhodes Univ. in South Africa. There is a story here too. Nobody does this…do they?

JE – It was not so common at the time. I was fortunate while an undergraduate that Dr. Delaplane allowed me to conduct three research projects which we later published in refereed journals. The point of a masters is to learn a field and to learn science. I felt I had already done both. By that time, I had kept bees for ten or so years, published popular and referred articles on bees, participated in a number of research projects, spoken to dozens of beekeeper groups, etc. So, I was fortunate to be able to forgo a masters and go straight into my PhD at Rhodes. Why Rhodes? Small hive beetles had just been found in the U.S. at the time. The USDA had an agreement with Rhodes University (in South Africa) to fund a student to study SHBs in South Africa. I was the fortunate student to be added to the project. I lived in South Africa for three years and enjoyed every second of my time there.

JH – You have always had a plan. What was it after getting your PhD? What did you want to do?

JE – I wanted to be a professor. That was my plan once I decided I wanted to go to graduate school.

JH – You did a Post Doc at UGA under Keith?

JE – After finishing my PhD, I returned to UGA and did a Post Doc with Dr. Delaplane. I was there for two years. It is also at that time that Amanda decided to do her PhD. So, she became one of Dr. Delaplane's PhD students. We were fortunate to be able to work in the same lab.

Jamie and family at the bee lab groundbreaking in October 2017. (Tyler Jones photo)

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JH – Was University of Florida on your short list or were there others?

JE – Most Post Docs, myself included, just want a permanent job anywhere they can find one. In 2006, I interviewed for and was offered the job I have now at UF. I had another offer from another institution at the same time. It was a hard decision at the time. Looking back, there honestly is no better place to work on honey bees than at UF. We have a wonderful university, a fantastic entomology department (currently ranked #1 in the world), and a great beekeeping community.

JH – What resources did you have when you started as an Assistant Professor at UF? What were your goals?

JE – My academic appointment is 70% extension, 20% research, and 10% instruction. Thus, when hired at UF, my start-up package (the amount of money I received when I arrived) was likely among the lowest offered to an assistant professor at that time. Given my high extension appointment, it was assumed I would not need much start-up. In fact, I had to ask for a lab because there seemed to be wavering interest in providing me one, given my low research appointment. I am not stating that as a shot at UF. I am just saying it because things have certainly changed since those days. At the time I was hired, I just wanted to find a way to help beekeepers in FL. Even before moving to FL, I was told by commercial beekeepers that the industry in FL is a hard place to survive. In fact, I even had one commercial beekeeper tell me that the FL beekeepers were going to "eat me alive." I know, of course, he meant that tongue-in-cheek. However, it certainly illustrates the disconnect that many in the beekeeping industry have with research/extension labs (and vice versa). So, it looked like an uphill challenge. However, my team and I have been fortunate to develop wonderful relationships with beekeepers in the state. I believe, in fact, that our partnership with beekeepers and other collaborators (of course, the Florida Department of Agriculture and Consumer Services, Division of Plant Industries among them) have improved the industry in FL and laid an important foundation for future efforts addressing the sustainability of beekeeping in FL and elsewhere. I am fortunate to be here.

JH – So, you are the new young scientist with a 70% Extension appointment walking into the Univ. of Florida only 20% research. I'll bet it was kind of scary in one of the biggest commercial beekeeping states. How did you connect with beekeepers?

JE – You may not remember it, but you as the Chief of Apiary Inspection at FDACS (Florida Dept. of Ag. and Consumer Services) had one of your key Inspectors, David Westervelt, take me around and introduce me to some of the most influential commercial beekeepers in Florida, which was a great start. Then, being able to go to and present at the Florida State Beekeepers Assoc. meetings and lots of local meetings, I was able to get my face and my message out there. We developed the 'UF Bee College' and that attracted hundreds of mostly smaller-scale beekeepers. We also produced a whole series of videos that were really popular. Furthermore, I worked with the Florida Farm Bureau on honey bee issues and served on various beekeeping-related committees. I also worked on research projects with you at FDACS. Despite this, networking with and gaining the trust of commercial beekeepers has taken some time.

Jamie in his grad school office in the Zoology and Entomology Department at Rhodes University, 2001.

JH – I keep thinking that you had a 70% Extension appt. How the heck did you get approval to start research and get a Lab?

JE – My Dept. Chair, Dr. John Capinera, knew that part of extension was conducting research for beekeepers and translating that research into actionable management practices. Dr. Glenn Hall managed the UF Bee Biology unit and allowed me to share space with him. I also had some lab space on campus, though it was quite a small lab. Finally, I was given graduate student funding as part of my start-up package. Thus, I had some lab space, an active student and grew the program from there.

JH – Tells us about how you grew your tiny Lab doing solid research for beekeepers into the amazing Lab you have now.

JE – It was all about years of hard work with outstanding support by the Florida State Beekeepers Assoc., Commercial Beekeepers, terrific students, lots of grant proposals, contracts to do honey bee work, federal grants and the continued support of my Dept. Chairs and colleagues. No one does this kind of thing alone. It took all of us working for the same goal (you know, kind of like a honey bee colony).

JH – Now you have a four million dollar plus Lab! How did that happen?

JE – I cannot remember exactly now, but about six or eight years ago, Laurence Cutts and Gordon Clauss (both FL beekeepers) came to visit me on campus one day. They had just started the Cutts Foundation, an organization with a goal of supporting honey bee research. They requested that I put together a list of research equipment I might

Continued on Page 89

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It's Summers Time –

January Meetings, Winter and Another Loss

I had the opportunity to attend the American Beekeeping Federation Conference again this year. Our advertising coordinator, Jean Newcombe, went with me. It was Chicago in January, but all the accommodations were wonderful so we just didn't go outside for three days.

Jean and I spend most of our time in the vendor area at these meetings, but we did take time to attend the opening ceremony and to listen to the first keynote speaker – Sammy Ramsey. Wow! If you have not had a chance to listen to him do a Google search and give a listen. He's not only really smart and doing some amazing work in Thailand, but he's just charming and entertaining also.

The word I got from a couple of different people on attendance was somewhere between 750 and 1,000.

The sessioins that I poked my head into all seemed well attended. We got to see a lot of you. That's always the best part of a meeting – seeing old friends and making some new ones.

The annual honey show was exceptional this year. There seemed to be more entries than past years. After judging, the show was on display in the vendor area.

Next January the ABF meeting will take place in Las Vegas, so start making your plans now. Also, on a side note, The American Honey Producers Association are changing their meeting to December starting this year. So you'll now be able to attend both if you want. The AHPA meeting for 2020 will be in Baton Rouge, LA.

It's mid-January as I finish this February issue and here in Northeast Ohio we have had a very strange Winter so far. Not a lot of snow, but great variables in the temperature. One day it's almost 70° and the next 35°. The chickens and the ducks and I'm sure the bees have all been a bit confused.

Our poultry population is at 16 chickens and six ducks. One duck unfortunately seems to have just disappeared. No distinct pile of feathers or signs of a struggle, just gone. And it seems like we might have six male ducks. So we'll see what Spring brings.

The chickens are doing well. We're getting about 10 eggs a day most days. We have one that gets out routinely and wanders around the yard digging in the mulch and underneath the bird feeders. Sometimes she makes it back in for the nighttime door closing and sometimes she doesn't. We're not exactly sure where she goes. Maybe to the neighbors who have chickens. She always makes it back home within a day or two.

As I write this we just found out last night that Ohio has lost a true beekeeping friend. Darl Stoller passed away January 10 at 89 years of age. I'm not sure how well he was known outside of Ohio, but here in Ohio if you've been in beekeeping a long time you probably met Darl at one time or another.

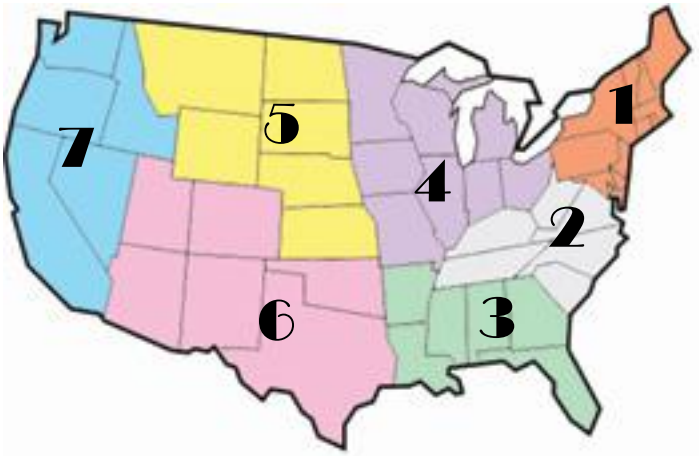
Darl and his family ran Stoller Honey Farm in Latty, Ohio. I met him in the early 90s when I first got into this wonderful world we call beekeeping. On occasion Darl would show up at the Root Company because we would buy beeswax from him. He would always stop by Kim's office to chat for a bit. And we would run into him at the OH State meetings and the Tri-County meetings. So we got to see Darl fairly often.

Ohio beekeepers will miss Darl. He was a friendly, familiar face in our lives. Thanks Darl for being part of our world.

I want to encourage you again when renewing online to make sure you are going directly to **www.Beeculture.com**. We're still having some issues with not getting your money in a timely manner because it goes to someone else first. If you are having issues with any part of your subscription please send me an email and I'll do my best to help – **Kathy@beeculture.com**.

I hope you are all having a peaceful, mild Winter. Keep watching the pages for all of the upcoming events for the Spring.

FEBRUARY – REGIONAL HONEY PRICE REPORT



Since many of our reporters keep bees to pay for keeping bees, it's instructive to occasionally observe what it is they are selling, because if it works for them it would probably work for you. This is year 10 for this survey, and, like the BIP surveys, though the sample size is small and volunteer, enough data over time begins to tell the story. Too, our reporters come and go so the sample size is constantly changing, which occasionally rearranges the data.

Wax and honey sales are steady, which is promising, but interesting considering the price of honey. However, the number of reporters selling wholesale honey has decreased somewhat from 67% last year to 55% this year. And, only 29% or our reporters sell bulk honey, but that looks about right.

Nuc numbers continue to increase, with this year's number higher than ever, with 39% selling them. This is in line with the general trend of beekeepers relying more on sales of bees than the sale of honey for income. However, sales or queens is dead steady, which is somewhat surprising with nuc and package sales inching up. Bee supplies bounced back this year, interestingly, with consolidation and expansion of the larger companies continuing, along with increasing outlets for supplies from non-traditional outlets like feed stores and the like.

A new question we asked this year had to do with using electronic equipment for remote monitoring of hives. None of our reporters are using any of this equipment, which we found interesting. We will have to dig into this a bit further next year, along with the number of our reporters who are part of the larger groups of beekeepers who are increasing education online.

An interesting note…fully 75% of our reporters in region 7 – the west coast – have pollination as part of their income, while only 25% or our reporters overall do that.

Other products sold? Full size hives, brood, bulk bees, bee feed, plus jams and jellies, and consulting and teaching.

	Candles	Ornaments	Wax Blocks	Honey Stix	Pollen	Propolis	Bee Supplies	Packages	Queens	Bulk Wax	Lotions	Soap	Creme Honey	Honey Retail	Comb Honey	Chunk Honey	Nucs	Pollination	Honey, Wholesale
% Reporters Selling																			
2010	28	17	54	28	28	13	20	9	15	48	20	10	35	90	66	38	28	-	-
2011	39	20	53	39	35	21	21	10	15	42	19	11	35	90	67	40	26	37	-
2012	35	21	53	37	32	15	53	10	22	44	18	13	21	94	62	34	23	32	-
2014	32	12	51	30	31	21	55	17	27	42	25	10	29	93	54	42	29	34	-
2015	30	14	56	28	32	17	40	15	27	40	17	5	30	90	62	38	32	33	-
2016	35	14	62	26	30	16	44	15	26	47	22	14	36	94	55	34	31	33	-
2017	27	13	52	27	25	12	36	13	20	30	22	13	27	83	48	40	28	23	52
2018	36	13	57	29	33	20	31	18	29	53	20	13	23	88	58	32	29	33	59
2019	32	10	61	35	23	17	19	16	30	41	23	21	32	86	53	29	31	32	67
2020	36	13	51	30	29	13	31	18	30	44	21	20	31	87	53	29	39	26	55

REPORTING REGIONS								SUMMARY			History	
	1	2	3	4	5	6	7	Range	Avg.	$/lb	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS												
55 Gal. Drum, Light	1.98	2.25	2.28	2.18	2.45	1.98	2.55	1.45-3.65	2.24	2.24	2.19	2.20
55 Gal. Drum, Ambr	1.95	2.18	2.14	2.15	1.45	1.85	2.43	1.35-3.25	2.09	2.09	2.11	2.10
60# Light (retail)	252.50	190.50	203.33	172.15	176.00	204.75	213.33	162.00-325.00	211.90	3.53	198.21	207.28
60# Amber (retail)	242.77	193.00	201.67	170.75	224.97	199.75	205.00	155.00-325.00	209.94	3.50	201.35	201.62
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS												
1/2# 24/case	130.06	75.30	93.20	72.00	61.20	84.00	112.34	61.20-194.40	96.89	8.07	85.83	87.13
1# 24/case	159.84	107.93	138.02	110.16	134.00	128.85	136.20	86.40-300.00	139.60	5.82	130.11	128.55
2# 12/case	139.49	97.13	123.82	114.40	111.84	104.40	114.00	79.20-246.00	125.19	5.22	119.88	113.42
12.oz. Plas. 24/cs	97.92	105.94	102.67	96.00	83.76	104.32	108.80	72.00-135.00	100.86	5.60	99.56	98.71
5# 6/case	135.12	112.47	190.20	133.38	113.16	115.50	135.73	90.00-190.20	131.36	4.38	138.38	127.63
Quarts 12/case	152.61	156.96	133.50	134.40	141.02	155.51	144.00	108.00-200.00	146.56	4.07	153.61	156.57
Pints 12/case	135.60	105.74	120.00	77.46	97.50	92.05	120.00	66.00-186.00	103.72	5.76	93.58	93.00
RETAIL SHELF PRICES												
1/2#	6.24	4.56	4.75	4.75	4.50	5.00	5.64	3.00-9.00	5.27	10.55	5.23	5.09
12 oz. Plastic	7.40	6.30	5.14	5.18	5.83	6.48	5.60	3.75-12.00	6.17	8.22	6.17	6.03
1# Glass/Plastic	9.50	7.38	8.14	6.75	7.39	7.08	8.14	4.79-17.00	8.08	8.08	8.33	7.65
2# Glass/Plastic	15.13	11.85	13.35	11.28	12.85	12.33	12.99	7.99-25.00	13.36	6.68	14.40	12.54
Pint	11.49	10.20	8.00	9.13	11.50	9.98	8.40	6.00-16.00	10.03	6.69	11.00	10.40
Quart	16.28	17.21	14.98	15.15	17.78	16.53	19.33	9.25-25.00	16.72	5.57	18.72	17.48
5# Glass/Plastic	30.69	25.79	39.00	28.20	25.02	26.48	50.00	16.89-50.00	29.27	5.85	29.68	27.92
1# Cream	11.34	7.94	8.00	9.06	10.10	8.50	10.61	5.44-16.00	9.90	9.90	10.88	9.74
1# Cut Comb	11.82	11.00	9.98	12.28	13.50	10.50	11.82	6.00-16.00	11.72	11.72	12.98	12.00
Ross Round	12.31	7.40	11.57	10.00	12.00	10.75	13.75	6.60-17.00	11.33	15.11	11.21	9.18
Wholesale Wax (Lt)	8.82	5.35	6.25	6.57	7.00	4.40	8.30	4.00-15.00	7.11	-	6.66	6.47
Wholesale Wax (Dk)	7.62	4.93	4.83	5.75	7.50	2.83	9.50	2.00-15.00	6.21	-	5.79	5.26
Pollination Fee/Col.	104.45	74.00	80.00	117.50	200.00	95.00	49.33	48.00-200.00	95.43	-	91.56	85.25

NEXT MONTH

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

Region One
- Check Hive Weight (Back Tilt Test)
- Weather permitting, Feed if weight is low.
- Clean Entrance and Bottom Board
- Check Ventilation and Moisture removal
- Consider Feeding Pollen Sub.
- Broodless now , treat for Varroa
- Keep working on equipment building and repair

Region Two
- Check Food Stores
- Check on Queen for beginning brood production
- Feed
- Consider splitting early weather permitting
- Check for deadouts
- Consider adding supers
- Treat mites
- Check on Queens
- Get ready for Packages
- Reverse Hive Bodies towards end of the month
- Rotate out Old Comb

Region Three
- Start Checking for Swarm Cells
- Feed before nectar flow
- Treat for *Varroa*
- Equalize colonies
- Build Hive Boxes in anticipation of Swarming
- Feed pollen sub.
- Add supers
- Take entrance reducers off
- Rotate Hive Bodies
- Check SHB traps

Region Four
- Check Colony weight. Feed if needed
- Treat for Mites
- Feed Pollen Sub.
- Reverse Hive Bodies
- Combine weak colonies
- Go to Bee Schools

Region Five
- Clean Entrances of Dead Bees
- Feed Sugar Syrup if Needed
- Feed Pollen Sub.
- Treat for Mites
- Start Splits
- Feed,Feed, Feed
- Continue Equipment Repair

Region Six
- Feed, Feed, Feed
- Culling of Old Equipment
- Clean Used Equipment
- Assess Number of Colonies to Split
- Mite Survey, Treat if above three per 100 bees
- Clean entrances of dead bees
- Check SHB Traps

More Honey Reporters Wanted

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

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BEE TALK

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

Question 1

All my bees have died. I treated for mites and they were down to two per 100. They have lots of food left but they are all dead on the bottom board. What happened?

A. There are too many reasons and scenarios when trying to find out why your bees died. Yes the first cause comes to mind is *Varroa*. As mentioned in the question *Varroa* was treated and the mite level is down to 2%. Starvation is second, but there was no sign of starvation. Despite colonies were treated for *Varroa*, it is important to know the following info about the applied mite treatment: What was the level of *Varroa* before treatment? When the bees were treated? Was the treatment early enough to protect developing Winter bees in late Summer - Fall from any virus infection? You kill mites, but already viruses already transmitted into bees. This could cause serious problem to be serviceability. What the colony health status after treatment, bee population and queen presence before wintering?

Generally investigating causes of bee colony mortality is tricky. A beekeeper must know how his colony was managed through the year and mite and nosema infestation must be monitored in addition to other bee diseases such as AFB, EFB, etc. Bee colony mortality can be potentially caused by other causes than *Varroa* and starvation. The other common reasons a colony could die is because of Nosema disease, small cluster of bees, going to Winter with Summer bees, queenless, and condensation within the hive.

A beekeeper should conduct an autopsy on dead bees in order to determine how the hive died and determine all possible scenarios before making conclusion based on supporting evidence and history of management. *Medhat Nast, Alberta*

A. Do you have any troubles with the neighbors? One cause of sudden die-offs like this would be an unusually acute exposure to pesticides/poisons. Another option is asphyxiation, if perhaps they clogged a too-small entrance hole. *Jay Evans, DC*

A. Dead bees on the bottom board usually indicates starvation whereas pesticide kills usually present themselves with piles of dead bees in front of the hive. If bees became separated from honey stores, even just centimeters away during a cold period, they are unable to move and can starve in place. *Jennifer Berry, GA*

A. It's difficult to tell without looking at bees and comb, or knowing when you treated. You might have treated too late, after the "Winter bees" had already been compromised, or a late-season mite influx might have swamped the colony.

The top suspect as usual is varroa – along with its associated viruses. While diseased bees often leave the hive to die, they may not be able to do so in the dead of Winter. *Eugene Makovec, MO*

A. There are some more questions that need to be answered. What was the mite count before treatment, and when was it done? If the mite count was over 6% and the treatment was done mid-August or later, the disease load on the bees trying to produce the Winter bees would have been too high for them to survive. The Winter bees would have emerged with the viruses and bacteria brought by the mites. Early death of the colony is the result. "All dead on the bottom board" leads to the next question, did they have a large enough cluster? If not, a brutal cold snap can take them out. Again, high mite/disease load reduces brood rearing, leading to small cluster size. Also, mites eat the fat bodies of bees, reducing their energy availability. Since they don't have stored energy, the bees must move to honey more frequently, and a few days of cold can kill. *Tina Sebestyen, CO*

Question 2

Here in the south bees are bringing in some pollen and starting to grow. When should I treat for Varroa? Should I sample first or just treat. I heard that Varroa might all be in cells reproducing so how do I know if I need to treat or not if they are outside the cell?

A. A beekeeper should treat when the level of mite infestation reaches a threshold. The recommended treatment threshold for colonies with brood is 2% when a sample of 300 bee collected from the brood nest washed in alcohol. In some places treatment is triggered when the mite level is 1-2% in tested colonies. When there is no brood it is recommended to treat when mite level reaches 3% or more. It is important for a beekeeper to monitor mite population through the year at least two or three times in Spring during bee population build up and two or three times in Fall as the bee population decreases. Thus, a beekeeper will be able to determine the proper time for treatment to protect bees from any serious damages caused by mites. Despite that mites reproduce in cells, not all mites are hidden in cells. Up to 30% of the

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adult mites are on bees known as phoratic mites. These are the mites to monitor. When treatment applied it will kill mites on bees as well as all mites coming out of cells with emerging bees. *Medhat Nasr, Alberta*

A. Sample them for safety, but hopefully your mites were under control in the Fall and that fact, combined with natural mite mortality over Winter, should mean your bees are in good shape to make many rounds of brood . With another mite check later in the Summer you can plan when to take action before or ideally after you harvest honey. *Jay Evans, DC*

A. With brood production increasing this month, so is the mite populations. If you are comfortable sampling and correctly analyzing the information, then sample first and treat if need be. However, if you are not comfortable with sampling then err on the side of caution and treat. *Jennifer Berry, GA*

A. If these bees survived the Winter, it's likely that *Varroa* levels are low coming into Spring, and your growing bee population should outrun the mite population at least into early Summer. Here in Missouri we test and treat (if needed) after the spring harvest (July 4 for me). It never hurts to test, but prophylactic treatments are hard on a colony and can lead to resistance issues. *Eugene Makovec, MO*

A. You are correct in thinking that mite counts will be artificially low in spring due to the mites being under cell cappings. Miticides are hard on bees, so I wouldn't just treat unless the count was over 2% in fall, and you didn't do a mid-Winter OA treatment. If the mite count was low in Fall, or you did an OA treatment, whether dribble or vaporization, then I would place a drone comb in or near the brood chamber in spring, and cull on time. Freezing for 24 hours kills mites in cells, and makes it easy for you (or the bees) to remove larvae and see mites. *Tina Sebestyen, CO*

Question 3

The weather is up and down and back and forth and bees were foraging and then they aren't. Doesn't this cause swarming? How do I stop it?

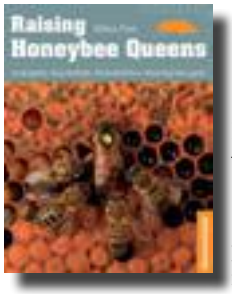
A. Check for queen cells and remove if you find them, and watch the colony for crowdedness, but the weather variation by itself should not induce swarming. *Jay Evans, DC*

A. Nest congestion, nectar flows and the urge to reproduce are reasons why colonies swarm. Preventing swarming is almost impossible. However, you can make splits, perform hive reversals, add supers, and re-queen to help reduce swarming. *Jennifer Berry, GA*

A. Swarming is mostly about congestion in the brood nest, with incoming nectar competing for space with egg-laying. Up and down weather will likely slow that down, but the conditions inside your hive, rather than outside, are what need to be watched. Provide space in the brood nest by checkerboarding with drawn comb or foundation, or create your own preemptive swarm via a split. *Eugene Makovec, MO*

A. Two major causes of swarming are crowding, and age of the queen. Crowding can be caused by an early flow filling needed brood space. Super early enough that bees can put honey in supers. Move honey out of brood area and add drawn comb, if available, to the edges of the brood chamber. Don't break up the brood area. Weather swings mean the cluster needs to be able to cover the brood. If the queen has been through one Spring build-up, the colony will want to swarm. Once you have at least eight frames of brood, pull the queen out into a nuc and allow the parent colony to raise a new queen. You get a nice brood break, and there aren't enough bees with the queen for her to get to swarm size before the flow is over. Do splits well before the ma-jor spring flow, so that they aren't even thinking about swarming yet, and they can recover and take advantage of the flow. Once the queen has two springs under her belt, she should be re-placed in Fall. *Tina Sebestyen, CO*

New For The Beekeeper –



Raising Honeybee Queens: An Illustrated Guide for Success by Gilles Fert, edited by Dr. Leo Sharashkin, afterword by Kirk Webster

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The author, Gilles Fert, is a professional beekeeper and queen breeder based in southwest France. He has taught queen rearing all over the world and served as a consultant for numerous conservation projects on six continents. His book is considered a standard reference in many countries.

"*Raising Honeybee Queens* is a most wonderful resource that has helped countless beekeepers raise their own bees and become self-sufficient. Translated into a dozen languages, it is probably the best queen-rearing book in the world." – Dr. Nicola Bradbear, Director, Bees for Development

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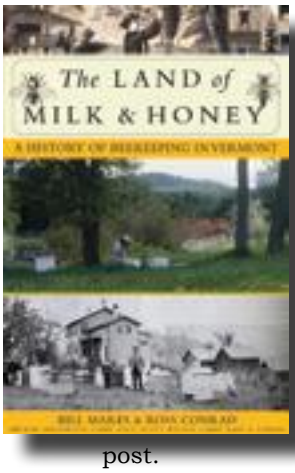
To get a copy of *Raising Honeybee Queens*, order online at **www.HorizontalHive.com** or send a check for $33 (this includes domestic shipping) to: Deep Snow Press, HC 73 Box 470, Drury, MO 65638. 144 pages, full-color throughout, over 150 illustrations.



Land of Milk and Honey: A History of Vermont Beekeeping, Ross Conrad and Bill Mares. Published by Green Writers Press, Brattleboro, VT. ISBN 978-1-9505841-8-5. 243 pgs. B&W and color. Available at *Bee Culture's* Bookstore. $30 includes domestic post.

This dramatic history begins in the early 1800s following the life and times of inspired beekeepers that are the advance guard of a line of notable beekeepers that is to stretch through the decades into modern times. You'll discover a beekeeping lineage born and raised within a single Vermont county that establishes a continuity of beekeeping knowledge and skill spanning more than a century.

The lineage of beekeeping concludes in the present day as apiculturists throughout the world face some of the most challenging times in over 200 years. Is it possible that by reflecting on the history of Vermont's beekeepers we can find clues about what is needed to help the honey bee thrive today and well into the future?

Land of Milk and Honey also explores the relationship between the people of Vermont and the countryside they inhabit: a land and people that shift and change through the decades in ways that directly impact the health and well-being of bees and its beekeepers.

The best part of this book, however, is the authors' intimate association with their topic, not only the bees of Vermont, but the people who keep them there. They are both long time residents of the state so have that going for them. That Ross writes for us on a regular basis is only a plus, and that we published Bill's book *Bees Besieged* several years ago kind of ties us all together.

That, and the fact that I've actually been around long enough to have experienced some of these events, attended the meetings and have known many of their heroes, and of course those that weren't.

Ross and Bill examine many of the early writers, most of which you will be unfamiliar with, but should be. They examine commercial beekeeping in the state, associations over time, and even the history of the Inspectors who called Vermont home.

Of course the Mraz family gets attention. Charles, a commercial beekeeper who made several advancements in beekeeping, including the fume board, made a mark in the Apitherapy world too. His son continues the family bee business there. And Kirk Webster is part of the story, as is Mike Palmer, EAS Conferences, the government and inspectors, and the commercial and hobby beekeepers . . .

Vermont, in many ways is a microcosm of beekeeping in America. *The Land of Milk and Honey* is rich in both beekeeping history and personalities. It's now in my library and it is a must for collectors of our past. *Kim Flottum*

The adventure started in 2010 when I decided to fulfill a childhood dream. I used to pickup the Sears and Roebuck Honey Bee Catalog and dream of keeping bees. My friend Bobby and I would sit and talk about those Midnight Bees. That's what I wanted. I was quite the farm boy with pigs, chickens and quail but I was never able to sell the idea to my dad of having bees on the farm. Later in life I was busy raising a family and was not able to pursue the honey bee dream.

I was sitting in an office in my late forties and read an article on honey bees, something form a long-time ago came alive again and the rest is history. My wife thought I was crazy and maybe I was but we started with a nuc in May of 2010 and drove down to Georgia and picked up a package in June. It was not the best time to start but we pulled it off. I talked Angie, my wife, into coming out one day to look at the bees and she became hooked. In the Spring we struggled with keeping enough supers and equipment on hand for the honey flow. It didn't get much easier when we went to pull honey. On one of the two hives we found brood above and below the queen excluder. Turns out we had two queens! Talking about leaving a newbee scratching his head and searching the internet night and day for answers just to find out these things weren't that uncommon. Through our experiences we quickly noticed bees and supplies were not easy to find around Northwest Alabama. As we learned more and worked the bees more I came up with the idea to make a little extra money selling bees and again Angie thought I was crazy. She said show me – (she is from Missouri) so we sat down, crunched some numbers, came up with how much we wanted to invest and T & A Bee Farm was born.

We started selling honey and nucs we produced on the farm trying to expand a little every year. Our main goal was quality! The first nuc we started with come to find out was the beekeepers rejects. The comb and frames were horrible and surprise – it didn't even have a queen. We didn't want our customers to get the same start we did. Soon we realized we could not produce enough bees so we started buying and selling 3# packages. Then came ventilated suits, tools, hand made crafts and some equipment. We are also now the Alabama Distributor for Strong Microbials Super DFM Probiotics for honey bees. We currently have had customers from eight states. We are also looking to expand into the northern states. We are very excited about our future and look forward to our growth.

Ted & Angie LeMay, **www.tandabees.com**, 256.331.BEES (2337).

MILLERBEES SUGAR SHAKE SCREEN™

Millerbees Mfg. has developed a new Sugar Shake Screw™ to be used with a standard 70mm canning jar threaded ring, Made in the U.S. The canning jar ring is also available from Millerbees Mfg.

The jar is not supplied, you can use one of many common readily available jars. To use 1.Measure a ½ cup of water 2.Add the ½ cup of water to your jar and draw a line at the water level. This line is approximately the level for 300 bees. 3. Add bees to the line. 4.Screw the jar ring with Sugar Shake Screen™ onto the jar. 5.Place about 2 tbs of powdered sugar on the screw and work it through the screen onto the bees. 6.Shake bees vigorously for about one minute. 7.Let the jar sit for one to two minutes. 8.Shake the sugar out of the jar on the top of a light colored surface, shite or aluminum hive tops work well. 8.Spray the sugar on the light surface with a squirt bottle. 9.Count the mites as the sugar will become transparent and the mites will "pop" on and be very visible. 10.Release the bees back into the hive.

Available at **www.beetlejail.com** $2 each. Free shipping.

New from the Southeast Bee Supply Family!

Mike Gardner, of Gardner/Spellbee, was a speaker at EAS last July and dropped by our booth to help us boost the Shamrock Queen Cage. During a slow time Mike and I discussed the CIVAN 25D extractor I had on display when he asked "why don't you build one that is turned on its side?"

So together we sat down with a yellow note pad and drew out the basic unit.

Fast forward to September of 2019 – I receive a photo of a working prototype! A few months and many emails later the CIVAN Maximum Gravity was ready! I told Mike it was going to be named the Mikey G but he thought perhaps Max G.

The CIVAN Max G is a 20-frame horizontal extractor which is adjustable to any size frame, from deep to shallow. It spins at a faster rate than the typical extractor and doesn't rip the comb. Honey drains to the lowest part of the unit and exits through a brass valve. The bearings, motor and shaft are industrial strength and have many years of life engineered into the overall unit. The entire extractor is 304 stainless steel and the extractor weighs in at a hefty 275 pounds. Nope, it's not gonna jump around!

Suggested retail price of the unit has not been confirmed, but it is expected to go for around $3,000. Not everyone's price range, but for the sideliner who wants the speed and versatility of a smaller horizontal it just may hit the mark.

We are accepting orders now for late Spring delivery.

For dealer inquiries go to **www.southeastbee.com.**

Number 1 Tip of the Month – Screen Board

Years ago I needed a way to keep bees and yellow jackets from getting into my hive top feeders while they were on the hive. I made a basic hive spacer from 1x2 lumber and stapled #8 hardware cloth across the opening. Now I have a screen board I can attach to the top of the hive top feeder to prevent bees and others from getting to the sugar syrup from the top.

I've also found this screen useful when transporting hives of bees. I remove the inner cover and place the screen board over the top deep. I then strap the hive together under the top cover. This ensures the bees will have adequate ventilation while they are confined in the hive during transportation. *Jerry Futrell, Rio Grande, NJ*

Just wanted to share with you something we have been incorporating on our top-bar hives (would work great with Langstroth too) to encourage native bees. Basically just a big piece of firewood with holes drilled in different diameters, which native bees then use to lay their brood and the adults use the holes to overwinter. After a couple of years just switch it out for a fresh one, to avoid diseases. I figure we all put a weight of some sort on our hives, to prevent the lid blowing off, so why not make it productive! *Peter Keilty*

Hey There! Send Your Ideas.

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

FOUND IN TRANSLATION

#Beeoptomism 2.0: Let's not go viral.

Jay **Evans**, USDA Beltsville Bee Lab

I am a huge fan of the #Beeoptimism movement. Built on a similar effort to see hope for our Earth in spite of it all (**https://earthoptimism.si.edu/**), Beeoptimism focusses on the 50% of colonies that survive annually, the honey jars and supers half full, and the hope that someone (I am guessing someone younger and smarter than me) will piece together real solutions for bee health. In the words of Earthoptimism proponent Dr. Nancy Knowlton of the Smithsonian, "Big problems without solutions lead to apathy. Big problems with solutions lead to action."

This year, I have winnowed my list of reasons to be optimistic down to five stories from the bee research world. These come from individuals and teams who have helped make a little more sense of bee life, or have come up with science-based solutions that seem ready to take up.

1) For the third month in a row, I have to marvel at the new insights coming from colony-level ways to monitor bee foraging, life, and death. For ages, we have known how to help or hurt bees in the lab, with acute stresses or disease agents. We have also known how to monitor colonies for diseases, growth, and decline. Only now are many labs conducting high-quality field trials by tagging hundreds of individual bees with Radio-frequency identification, or RFID, tags (think low-tech ankle bracelets) to show when bees do things right or wrong over their lifetimes. Coupled with accurate scales to weigh individual bees after they land from trips, cameras to check their appearances, and analytical tools to chew through all the data, this advance will help address a number of challenges to healthy beehives.
2) The Bee Informed Partnership (**www.beeinformed.org**) and the USDA-NASS national bee health survey (**www.nass.usda.gov**) again make the list for collecting survey information (thanks, beekeepers!) and data from numerous other sources as a means of monitoring the industry and what is working for bees. They are now joined by 'Beescape', an ambitious effort from Pennsylvania State University and several partners (**www.beescape.org**). Beescape focusses on neighborhoods around apiaries, or potential apiaries. Currently Beescape allows people to obtain information on land use, seasonal forage resources, wild bee nesting habitat, and pesticide risk around their apiaries. The results could be quite practical if you are a beekeeper choosing between a backyard apiary or hitting up an uncle 30 miles away. The Beescape team is now modeling how these factors, and weather conditions, influence honey bee colony survival and performance, and plan to release a winter survival prediction tool in early 2020. Beescape also offers interactive programs for volunteers interested in sharing data on their honey bee colonies to help improve these models.
3) It is hard not to be optimistic about the range of natural products being vetted right now to improve bee health. Our group has jumped on this topic, and even wrote a recent manifesto and recipe book for researchers (**https://www.mdpi.com/2075-4450/10/10/356**), but the field of scientists looking into this is diverse, broad, and not necessarily new to the hunt. Groups seeking ways to improve bee health through natural products include plant forage experts, longtime researchers in bumble bee ecology, experts in mushrooms, and chemists who are disentangling the many components of propolis. Chemistry is chemistry, and some sure-fire natural products are likely to be *bad* for honey bees, while nearly all of the rest will have no real impact on bee health. Still, it is impossible not to be optimistic that somewhere out there is a perfect extract, or molecule, that makes bees resilient in the face of viruses and other diseases. It is also entirely possible that, as with propolis, bees have recognized the benefits of specific natural products for millions of years. In that case, our job is simpler in that we just have to confirm what they know and shorten the trip to get these goodies into the hive.
4) Honey adulteration remains a big deal for honest beekeepers and consumers. In the past year, government agencies in the U.S.

and elsewhere have tested new technologies to identify funny honey and hold people to account for it. One recent study, by Huijun Wang and colleagues in China and the United Kingdom, accurately identified different honeys to their plant sources, and spotted adulterants such as corn and rice syrup at the level of 5% ("A novel methodology for real-time identification of the botanical origins and adulteration of honey by rapid evaporative ionization mass spectrometry", *Food Control*, December, 2019, **https://doi.org/10.1016/j.foodcont.2019.106753**). In "Use of NMR applications to tackle future food fraud issues", (*Trends in Food Science and Technology*, 2019, **https://doi.org/10.1016/j.tifs.2019.07.035**) Anatoly Sobolev and colleagues discuss ways of economizing the machines and diagnoses need to validate honey and other foods. While these technologies are part of an arms race with those hoping to evade them, the science seems to be winning for now.

I will end with a story for the future that has sucked me in despite being way out of my scientific wheelhouse. First, it is undeniable that bees of all sorts do better with fields of flowers than fields of turf. For bee fans, the 50+ million acres of turf in the U.S. (**https://agamerica.com/turfgrass-industries/**) represent a blank canvas. Turf ranks among the top three U.S. 'crops', with soybeans and corn. As with soy and corn, tapping into the turf environment by making it more bee friendly would be a really big deal. Many property owners seem quite satisfied with a turf lawn but others, given a nudge, would rather turn their lawns into a more functional space by supporting bees and other wildlife. So-called 'bee lawns', with a little effort, can be beautiful and enriching for honey bees and other beneficial insects (**https://www.beelab.umn.edu/learn-more/beelawn**). Most lawns, with small changes in mowing and herbicide behavior, will support white clover and other flowers for much of the year. Mr. Steve Hess, of Indiana, runs his own environmentally focused pest control business. He is an entomologist who walks the fine line between removing pest insects and protecting his beloved bees. He was acutely aware that his high-speed commercial lawnmower was mulching numerous bees, and there was no way that either he or his bees could avoid collisions. Knowing the turf stats above, he also calculated the country-wide bee losses due to lawn maintenance and was appalled. Mr. Hess' conscience and creativity have led to one possible solution. He has invented a cattle guard of sorts for riding mowers, meant to gently lift bees above the mower deck just before they are sucked into the blades. He and his engineering partners continue to improve the details, but a patented model that we have both tested seems durable and likely to save some bee lives. The testing protocol consists of strapping a video camera in front of the deck and mowing fields of clover with and without the guides. Despite many acres of footage, and one mulched iPhone, it is surprisingly hard to quantify how many bees take flight versus drop to the turf and under a mower deck. Still, we have seen enough of the latter, and enough improvement with the guides, to indicate that this will be a great holiday present for landscapers and bee lovers someday. Mr. Hess remains passionate about this and is one of the hardest working people I have met. If you would like to learn more about these 'Bee Guards', you can contact Mr. Hess directly at **idbugu7@gmail.com**.

So . . . go out there with optimism and realism and double your honey this year, or at least plant some flowers and mind the bees. BC

A Closer LOOK

QUEEN PHEROMONES

Clarence **Collison**

Queen pheromones and their impact on drones.

Honey bee queens produce pheromones responsible for mediating both drone mating behavior and many critical facets of worker social organization within their colony. These pheromones are dynamic multi-component blends, allowing the communication of detailed information. Queen pheromones can elicit both primer and releaser responses. Primer pheromones elicit behavioral and/or physiological effects that occur over several days, while releaser pheromones elicit immediate behavioral responses. Queen pheromone components are produced in multiple glands (Trhlin and Rajchard 2011). Glandular sources for queen pheromones include: mandibular glands, tergite glands, Dufour's gland, Koschevnikov gland and tarsal glands. "The pheromones produced by the queen and their interactions can be complex and complementary, as components produced within and/across glands often yield redundant (Wossler and Crewe 1999a; Maisonnasse 2010) or synergistic effects, such as increased retinue response (Keeling et al. 2003). Furthermore, the chemical composition of glands and the associated behavioral and physiological responses of workers, can be modulated by the queen's mating or reproductive state (Kocher et al. 2009; Niño et al. 2013) (Villar et al. 2019)." Few studies have examined the effects of queen pheromones on drone behavior other than serving as a sex pheromone during mating.

"The honey bee queen produces a "bouquet" of at least five chemicals in her mandibular glands, referred to as queen mandibular pheromone (QMP), [9-keto-2-(E)-decenoic acid (9ODA); 9-hydroxy-2-(E)-decenoic acid (+/-9HDA); methyl p-hydroxybenzoate (HOB); and 4-hydroxy-3-methoxypheylethanol (HVA)] that act as pheromones which strongly influence worker bee behavior. One of the compounds, 9-keto-2-(E)-decenonic acid (9-ODA) is also known to attract flying drones. The five separate synthetic chemicals, QMP extract, virgin queen extract and an additional chemical from a plant source which has been reported to be an attractant to honey bee drones were tested to evaluate drone response in the field. Test chemicals were evaluated (10 meters above ground) on a line strung between two poles (47 meters apart) in a drone flyway. The chemicals were applied to cotton wicks in pseudoqueen devices and elevated two at a time for five-minute intervals. Visual observations of drone response and counts of fly-by, hoverings, contacts and copulations with the pseudoqueens were made. Weather conditions (excessive winds) reduced the number of copulations obtained: there were 12:10:8 at pseudoqueens loaded with 0.6 queen-equivalents (Qeq.) of QMP: 9-ODA: virgin queen extract, respectively. Drones did not respond in any way to any of the other chemicals (Loper et al. 1996)."

The queen-produced pheromone 9-ODA (9-oxo-2-decenoic acid) serves as both a social pheromone (priming physiological processes mediating worker behavioral maturation) and sex pheromone (attracting males during mating flights). While Villar and Grozinger (2017) "expected the primer effects of 9-ODA on workers to represent a derived worker-specific function, i.e. queen rearing inhibition, surprisingly they found primer effects in drones. Exposure to 9-ODA resulted in a significant increase in expression levels of vitellogenin in drones. Since previous studies in workers found that vitellogenin levels regulate behavioral maturation, they investigated 9-ODA's effects on sexual maturation in drones. Drones exposed to 9-ODA initiated mating flights later and took fewer flights than control drones. Their results demonstrate that honey bee queen pheromone has primer effects on drone bees, and thus chemical communication systems involving drones are more complex than previously expected."

The major component of the mandibular gland secretion of queens, 9-ODA ((2E)-9-oxodecenoic acid), is well known as a long-range sex pheromone, attracting drones at congregation areas and drone flyways. Tests of other mandibular gland components failed to demonstrate attraction. It remained unclear whether these components served any function in mating behavior. Brockmann et al. (2006) "performed dual-choice experiments, using a rotating drone carousel, to test the attractiveness of 9-ODA compared to mixtures of 9-ODA with three other most abundant components in virgin queen mandibular gland secretions: (2E)-9-hydroxydecenoic acid (9-HDA), (2E)-10-hydroxydecenoic acid (10-HDA), and p-hydroxybenzoate (HOB). They found no differences in the number of drones attracted to 9-ODA or the respective mixtures over a distance. However, adding 9-HDA and 10-HDA, or 9-HDA, 10-HDA, and HOB to 9-ODA

The honey bee queen produces a "bouquet" of at least five chemicals.

increased the number of drones making contact with the baited dummy. On the basis of these results, they suggest that at least 9-HDA and 10-HDA are additional components of the sex pheromone blend of *Apis mellifera*."

"Synthetic (E)-9-oxo-2-decenoic acid (9-ODA) was as attractive to drones as ether extracts of queen heads, suggesting that 9-ODA is the component of the sex pheromone that attracts drones from a distance. However, other substances produced in the heads of both virgin and mated queens cause drones to hover near a lure. Positive anemotaxis (responsive movement of an organism toward or away from an external stimulus) and short-range visual stimuli are also involved in the mate-finding process. The gradual release of the pheromone (E)-9-Hydroxy-2-decenoic acid (9-HDA) did not attract drones from a distance or affect their behavior near a lure. Synthetic 9-ODA was slightly attractive to worker bees from a queenless swarm and 9-HDA was not attractive. However, ether extracts of whole queens or queen heads contain unidentified substances that are highly attractive. These are produced more abundantly by mated laying queens than by virgin queens (Boch et al. 1975)."

"Extracts of mandibular glands taken from adult queens of *Apis mellifera carnica*, were analyzed by gas chromatography-mass spectroscopy. More than 100 compounds could be identified among which oxygenated fatty acids with six, eight, 10 and 12 carbon atoms are particularly interesting since they show structural relationships to the queen substance, (E)-9-oxo-2-decenoic acid. Changes in the patterns of volatiles were followed up from emergence until the full dominant status of an egg-laying queen in a strong colony. Generally, the amount of volatiles per gland was found to increase with age. The final level of queen substance (9-ODA) content is reached at the post-mating stage about 10 days after emergence (Engels et al. 1997)."

"In addition to mandibular gland components, there is evidence that the contents of the queen's tergal gland also functions in attracting drones during mating flights. Renner and Vierling (1977) found that the addition of tergal gland extracts to 9-ODA increased short-range attraction and copulation attempts to queen dummies containing the chemicals. The specific tergal gland compounds mediating increased attraction in drones are still unknown, though several studies detected up to 50 compounds in the gland extract (Espelie et al. 1990; Wossler and Crewe 1999b) and have demonstrated the ability for tergal gland contents to mediate attraction in other castes (Okosun et al. 2019). Octadecenoic acid was found to be the predominant compound in both mated and virgin queens. Additionally, virgin queens differed from mated queens in that they produced a series of long-chain esters, of which decyl decanoate was predominant.

However, though virgin and mated queens produce distinct tergal compounds, their respective ability to elicit different responses from drones has not been fully tested (Villar et al. 2019)."

"Odor-mediated interactions between honey bee queens and drones have been characterized primarily in the context of mating behavior. Drones identify and detect virgin queens over long distances by 9-ODA, which serves as a sex pheromone in this context and can recruit drones over hundreds of meters (Boch et al. 1975). Secondary (non-9-ODA) QMP components are unable to recruit drones over long distances (Loper et al. 1996) and the whole QMP blend was found not to elicit attraction from drones in a walking simulator (Brandstaetter et al. 2014). In combination with 9-ODA, however, blends of 9-HDA and 10-HDA (and possibly HOB) increase short range responses to impregnated queen dummies, resulting in increased contact and copulatory attempts by drones (Brockmann et al. 2006). Interestingly, since drones are only attracted to virgin queens under natural conditions and previous studies have found 9-HDA, 10-HDA and HOB are present in large quantities in mated and laying queens as well as in virgin queens, it suggest that other compounds may be involved in mediating these differences in attraction, and/or the relative amounts of these compounds could be important in determining attraction (Slessor et al. 1990; Engels et al. 1997; Plettner et al. 1997; Strauss et al. 2008). A putative (generally considered) odor-mediated mechanism regulating differential attraction by drones to virgin vs. mated queens, therefore, suggests that there could be novel compounds or compounds that are produced at higher levels in mated versus virgin queens that may repel drones from mated queens when they encounter them in or outside of the colony. Alternatively, attraction of drones to queens may be entirely context dependent, making virgin and mated queens equally attractive if they would be encountered during mating flights (Villar et al. 2019)."

"Renner and Vierling (1977) developed a bioassay to quantitatively determine the biological significance of both 9-oxodecenoic acid and the tergite gland secretion of the queen to drones. By this method it was possible to analyze clearly the different effects of these secretions to drones. As already demonstrated by Butler (1971) drones were attracted by 9-oxodecenoic acid from distances of 50 meters or more. The pheromone of the tergite glands was effective, close up to the queen only; within short distances (less than 30 cm) its attractiveness predominates."

"Villar et al. (2019) evaluated whether drone long- and short-range attraction is mediated by chemicals produced in the mandibular or tergal glands of queen honey bees by evaluating drone attraction to paired comparisons of gland extracts of virgin and mated, laying queens. They also determined if the blends and responses are altered by the queen's mating and reproductive state.

Additionally, they chemically analyzed the contents of the mandibular and tergal glands of virgin and mated, laying queens to identify candidate compounds that might be involved in mediating these interactions. In particular, they examined the glands for compounds that were present at significantly higher levels in virgin versus mated, laying queens, and thus may be involved in attracting drones during mating flights, and those present in significantly higher levels in mated, laying versus virgin queens and thus may be involved in repelling drones from the mated queen in colonies. Long-range attraction of drones was significantly greater to virgin versus mated, laying queen mandibular gland extracts. Long-range attraction of drones to mated, laying and virgin queen

The queen-produced pheromone 9-ODA (9-oxo-2-decenoic acid) serves as a sex pheromone (attracting males during mating flights).

tergal extracts was not significantly different. Drones did not show a difference in short-range attraction or contact responses for the two types of glands. They found that drone attraction to the chemical blends of mandibular glands produced by mated, laying queens versus virgin queens is reduced, suggesting that the queens produce a reliable signal of their mating receptivity. Interestingly, while the chemical blends of mated, laying queens and virgin queens largely overlap, mated laying queens produce a greater number of chemicals and greater quantities of certain chemicals than virgin queens, suggesting that these chemicals may serve to inhibit behavioral responses of drones to mated, laying queens."

"Villar et al. (2019) "identified 24 mandibular and 34 tergal gland compounds, while 32 mandibular and 30 tergal compounds remained unidentified. These compounds were present in at least 30 percent of the virgin or mated laying queen samples. To their knowledge, these counts are higher than previously reported for tergal, but not for mandibular glands (Espelie et al. 1990; Engels et al. 1997; Kocher et al. 2009; Niño et al. 2013)." BC

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150TH ANNIVERSARY

The A.I. Root Company – Then To Now

A.I. Root, C.P. Dadant and L.L. Langstroth

Malcolm **Sanford**

The 150th Celebration at the A.I. Root Company exceeded all expectations. Beyond the various presentations, it was announced that long-time editor of *Bee Culture*, Kim Flottum, is stepping down and taking his place will be Jerry Hayes, who readers might know as the current author of *American Bee Journal's* extremely popular monthly column, "The Classroom." Mr. Hayes has a long history of employment in regulatory (Florida State Apiarist), research (Monsanto's now Bayer's honey bee point person), and is currently North American Vice President of **Vita Bee Health**. This transition could mean some interesting developments in the possible future alignment and focus of both monthly bee magazines that have been in publication since the 1800s.

Another focus of the celebration was the historical and current role of women in beekeeping. Tammy Horn Potter, known for several books in the apicultural field and current **Kentucky State Apiarist**, discussed the current "feminization" of long-standing male-dominated beekeeping organizations. The Apiary Inspectors of America Is perhaps the best example (**AIA**), but others exist. She reported that Joan Gunter will be the first woman elected president of the American Beekeeping Federation (ABF) in 2020.

Sarah Red-Laird, the Bee Girl, and ex-president of the Western Apicultural Society (WAS) wrote the following in her blog at the conclusion of that conference last summer in Oregon: "Today as I fly home from the Western Apiculture Society Conference I've been processing just how special this gathering was. Not only was it my first beekeeping conference to attend but also my first invitation to speak and teach at one. However, that isn't even what was so unique. What was really special is that every single expert on stage was a female. We had women scientists and researchers, entrepreneurs, community leaders and activists all gathering around our shared love and passion for raising healthy bees."

A huge influence on the Bee Girl and other females in the beekeeping field has been Dr. Marla Spivak, who is the only apicultural researcher to become a MacArthur Genius Award winner, and currently is McKnight Distinguished Professor in entomology at the University of Minnesota. She has pioneered research in propolis, honey bee breeding, and the development of what is called the "Bee Squad," a citizen science activity to collect data on honey bee colonies throughout the Twin Cities and metropolitan area.

This initiative seeks to identify trends in particular geographic areas and gaining insights into honey bee health, promising that "your bees will contribute to the science of good beekeeping; Bee Squad uses the data from your bees to communicate best management practices to beekeepers in the region and to contribute to the national conversation amongst beekeepers and scientists on how to make our bees thrive." She is currently director of a fairly new beekeeping laboratory at the University of Minnesota **https://www.beelab.umn.edu/**.

Eye-opening statistics on U.S. women farmers and beekeepers were provided by Ms. Horn Potter. Well over 960,000 farmers in U.S. are female, with an economic impact of $12.9 billion. National/Regional honey bee groups are 30.4 percent female, with state groups about the same, and local bee clubs exceeding 42 percent.

Ms. Horn Potter's current relationship with the family of a significant female Root employee or "hand," Jane Cole, was on display at the celebration. Ms. Cole by all accounts, contributed greatly to the success of the company during its early years. Several contemporary relatives of Ms. Cole in fact attended the event in Medina. Finally, it is significant that although Mr. Flottum is "retiring," his wife and long-term "hand" at *Bee Culture* (Kathy Summers), is staying on and will continue to contribute to the magazine, making Mr. Hayes' transition to full-time editor as smooth as possible.

It was striking that three historical giants in the apicultural field showed up in person at the Medina celebration. L.L. Langstroth and A.I. Root himself and C.P. Dadant were on display on occasion, and also in cardboard images, where those attending could in fact have pictures taken with these historical figures.

The former celebrity was played by the ineffable Marc Hoffman, who is known for his portrayal of the Father of American Beekeeping in a three-act beekeeping production that has entertained beekeepers and others around the country. Entitled *Bee Man,* the one-man production in three acts follows the career of the Reverend L.L. Langstroth who lived from 1810 to 1895. He was an inventor,

The lineup of speakers for the 150th celebration – left to right, Malcolm Sanford, Tammy Horn-Potter, Kim Flottum, Jerry Hayes, Marc Hoffman, Jim Thompson, Jim Tew and Wyatt Mangum.

scholar, author, abolitionist, minister and thought perhaps to be manic-depressive (bipolar). The play reveals the dramatic ups and downs of Rev. Langstroth as he came to grips with his love for honey bees and how he saw in them much of the successes and failures of human society during his time. Mr. Hoffman brought his rendition of the original Langstroth hive to this event, providing some interesting facts concerning the structure, along with a description of the challenges that Langstroth faced in his numerous efforts to defend his patents associated with the device.

Amos Ives Root was really the focus of the celebration, his life and career colored the whole event. As written in the introduction to the 41st edition of the *ABC and XYZ* of beekeeping, first published as ABC in in *Bee Culture* (1878), Mr. Root stated: "Beginning in 1865, when a swarm of honey bees passed overhead where we were at work, and my fellow workman, in answer to some inquiries respecting their habits, asked what I would give for them. I, not dreaming he could by any means call them down, offered him a dollar, and he started after them. To my astonishment, he, in a short time, returned with them hived in a rough box he had hastily picked up, and, at that moment, I commenced learning my ABC in bee culture." The idea behind the volume, which continues today, was to "purpose it to never be out of date or behind the times."

In a few short years, Mr. Root's education in bee culture had morphed into the A.I. Root Company (1869), which specialized in producing beekeeping equipment. The golden age of beekeeping (1859 to 1890) was beginning to be in full flower, based on large amounts of comb honey being shipped by train to large cities. A.I. Root's son, E.R. reported that in the 1880s and 90s the company assumed "massive proportions," such that "the proprietor himself was almost demoralized by the mass of business that poured down upon him."

He reported the following in 1905: "Something like a dozen clerks are employed almost constantly in our main home office..answering letters, keeping books, and doing general office work . . . From three to four stenographers are required . . . and six typewriters are kept in use the greater part of the time."

The conclusion: "There are scattered over the various portions of the United States ten branch offices under the name of the 'A.I. Root Co.' Besides these there are something like fourteen or fifteen large agencies that handle goods by the carload . . . and many branch offices and agencies keep in touch with the home office."

A.I. published the first edition of his magazine, *Gleanings in Bee Culture*, in 1872, and it has continually been in print since. The "Gleanings" was subsequently dropped from the title, but the magazine continues to inform and inspire beekeepers everywhere.

Over the course of the two-day celebration, several things became apparent about A.I. Root. Beginning as a jeweler and moving into apiculture, he was part of larger historical context that can be described as "entrepreneural investigation." His innovations were often not so much new (patentable), but built upon the ideas of others.

For example, A.I. did not invent the movable frame hive, but was responsible for improving what he considered to be a "superior" box, by using shallow frames for honey that could be "tiered" up vertically for maximum production. He based his factory production on these "standard" hives, frames and other equipment for general bee culture, which still exists today. He saw the importance of a smooth outside with recessed hand holds, and abandoned the landing portico that was a hallmark of the original Langstroth design.

He noticed differences in beeswax based on location in the hive. The capping wax was most adaptable for further processing, which became the first commercially successful comb foundation. He made the first all-metal extractor, the Novice, and was the first to manufacture one-pound sections for use in comb honey production. He helped improve the Quinby smoker, resulting in the standard Bingham model mostly still in use today.

A pioneer In the management of honey bees, A.I. was the first to attempt to breed and send queens through the U.S. mail. Shipping honey bees in screened cages (packages) was his idea as was developing technologies to maximize hive size encouraging maximum honey production, while keeping bees from swarming. He extracted a full barrel of honey from a single hive dubbed "Giantess," something bee masters at the time thought impossible.

The end of the 19th and beginning of the 20th century would shift developments in beekeeping in a number of ways away from the "entrepreneurial development" that was in vogue. The rise of the scientific method (pioneering research on American foulbrood), including institutionalized information development and education in beekeeping (land-grant colleges), as well as the beginning of the federal government's effort in the newly established Bureau of Entomology and Plant Quarantine in Bee Culture (U.S. Department of Agriculture) contributed to this phenomenon.

1938. History of American Beekeeping History of American beekeeping by Frank Chapman Pellett.

Frank C. Pellett summed up these changes in his History of American Beekeeping, published fifteen years after the death of A.I. Root in 1923:

"The World War (1918) brought great changes to American beekeeping with emphasis on production and marketing of honey, rather than on beekeeping as an interesting diversion, as it long had been. With the high prices which came with the postwar boom, expansion became the rule, and the rank and file of beemen became honey producers rather than beekeepers as of old.

"The old-time leadership, which rested with men who lived leisurely among the bees, has been replaced by scientifically trained men in the U. S. Department of Agriculture and our state institutions. When, during the war, Phillips and Demuth conducted their short course schools of apiculture in many widely separated places, they paved the way for institutional leadership.

"The Bee Culture Laboratory under Dr. E.F. Phillips under took research in a variety of problems too difficult for the beekeeper or requiring facilities beyond his reach. Many new facts have been brought to light, the far-reaching results of which it is too soon to measure. Several state agricultural experiment stations have followed with research investigations far in ad vance of former years. Most of this work is left for measure in future years after there has been time for its completion and opportunity for observation of its effect.

"One thing is very clear; we have abandoned the old paths. The old-time beekeeper was something of a naturalist, interested primarily in the behavior of his bees. The beekeeper is now a business man interested primarily in the sale of enough honey to maintain the present day standard of living and give his family the things that the new generation demands."

Pellet's book is available on the World Wide Web in several places and deserves attention by anyone interested in this subject. It is too bad that no follow up volume has been produced. Indeed, A.I.'s first act after his encounter with that initial swarm of bees, was to find as much published information as he could on honey bees. He read Langstroth's works and the seminal volume by Moses Quinby, The *Mysteries of Bee-Keeping Explained*, published in 1853. The April 1, 1915 edition of *Gleanings in Bee Culture* was dedicated to Quinby's life and teachings in beekeeping **https://en.wikipedia.org/wiki/Moses_Quinby**. A more in depth discussion of Quinby is available on the Bee Culture website: **https://www.beeculture.com/moses-quinby/**.

Dr. Jim Tew, retired extension entomologist from The Ohio State University discussed the repertoire of published materials available to Root that existed then and today in his talk entitled, "Beekeeping Authors We Know and Don't Know. Deserving special attention was Quinby's work as well as the classic volume, Fifty Years Among the Bees by the pioneering queen breeder, Dr. C.C. Miller, in fact published by the A.I. Root Company in 1911.

Coincidental with the changes listed above, regional and national beekeeping associations were on the rise, most dealing with the continuing fight against adulterated honey that continues even today. Dr. Harvey W. Wiley, wrote the following in the Popular Science Monthly, June, 1881: "**In commercial honey, which is entirely free from bee mediation, the comb is made of paraffin, and filled with pure glucose by appropriate machinery."** In response to this, (known at the time as Wiley's 'lie'), and what was considered at the time to be an attack on comb honey, beekeeping's major income stream, A.I. Root offered $1,000 to anyone who could prove that comb honey had ever been successfully imitated. No takers were reported in Pellet's book. Thus, Root became an ardent supporter of the pure food movement. He and his sons were recognized as leaders in this campaign over the years, which finally resulted in the passage of the Pure Food and Drug Act in 1906.

Continuing with the historical theme of the Root celebration event, presentations by Jim Thompson, beekeeping historian and Dr. Wyatt Mangum, who has amassed a collection of historical beekeeping equipment over the years, provided perspective. Mr. Thompson brought along his collection of devices and other paraphernalia associated with manipulating honey bee hives. Most significant was his collection of hive tools. It is possible to read about Mr. Thompson's ideas concerning the development of various beekeeping devices on the *Bee Culture* web site **https://www.beeculture.com/beekeepers-adaptive-inventive/**.

Dr. Mangum is Professor at University of Mary Washington in Virginia and one of the best known proponents and pioneers of a technology known as top bar beekeeping **https://www.beeculture.com/whats-hot/** and has written a book on the subject **https://beekeep.info/a-treatise-on-modern-honey-bee-management/management-tools/bee-hive-design/top-bar-hive-a-kindler-gentler-beekeeping/**. He discussed his current activities, specifically looking at historical developments of smokers and foundation mills. He also manages a website providing examples of honey bee behavior **https://www.youtube.com/channel/UCIn70gRNgxYMKLVr9LE7N-w** and is a frequent contributor to the beekeeping press.

The A.I. Root Company was an active participant in numerous beekeeping associations over the years, the family is often referred to in Vern Milum's History of Our National Beekeeping Associations, published by the American Beekeeping Federation in 1964, listing a plethora of these outfits from 1860 through 1954.

A.I. Root Co. signed up as the charter commercial member of the Eastern Apicultural Society (EAS) in 1955. President John Root at the time of EAS 50th anniversary stated he was "incredibly proud of that distinction," adding that the company had been represented at every meeting EAS has held since. Mr. Root was selected temporary Chairman of the Board when that position was created in 1977. He helped organize the 1978 meeting at Wooster, OH attended by over 600 people, and the Root Co. was heavily involved in the Year of the Hive in 1995 (600 in attendance) at the same venue (Kim Flottum, president), as well as the 50-year anniversary in Kent (Kathy

Summers, president). Ohio (2005) **http://apisenterprises.com/papers_htm/BC2005/EAS'%2050th%20Anniversary%20in%20Ohio.htm**

The Ohio State Beekeepers Association is one of, if not the oldest association in the country, according to Milum's accounts, going as far back as 1861. It's current mission statement tells the tale: "The tradition of beekeeping history in Ohio is reflected in the membership and past membership of OSBA. Ohio, the home of the A.I. Root Company and final resting place for L. L. Langstroth and A.I. Root, is proud of its role in this tradition. The Ohio State University continues to lead in honey bee research and beekeeping extension. While the state no longer has the largest bee-supply manufacture in the world, or sends out more queens than any other state, we still have some of the best beekeepers in the world."

The association website reveals a list of historical documents, including newsletters dated back as far as 1888. That year the A.I. Root Company set up a Centennial Honey Exhibit in the Capital of the state. **http://www.ohiostatebeekeepers.org/wp-content/pdf/history/newsletters/1888.pdf**

This author was asked to talk about Ohio's beekeeping history, not only in terms of its association, but also its regulatory, research and extension efforts as part of the A.I. Root celebration. A timeline published by Deer Creek Honey Farms in London, Ohio, just outside of Columbus is a good beginning reference. **https://deercreekhoney.com/timeline** This four-generation beekeeping family began in 1915 when the patriarch Winston and his twin brother Wesley Dunham (12 years old) bought their first beehive in Bethel, Vermont. Winston worked for beekeepers J.E. Crane and subsequently Frank Manchester in 1920, managing up to 300 hives, while attending the University of Vermont. In 1925, he enrolled in graduate school at Cornell University, taking a job the next year at The Ohio State University while earning his Masters of Science degree in 1926 and Doctorate in 1930, while beginning to increase the size of his own apiary. From 1930 to 1938, - Winston continued to divide his time between teaching at OSU, doing research with the Ohio Agriculture Experiment Station, and working as a beekeeping specialist with the Ohio Agricultural Extension Service. The Deer Creek honey house was built in London, OH for the purpose of extracting and bottling honey in 1938.

The research and extension beekeeping program that began with Winston Dunham was split up over the years. Charlie Reese from West Virginia became Ohio Extension Specialist in the 1950s

Charles A. Reese was Ohio State Apiarist from 1923 to 1947 and continued as an Ohio State Extension Apiarist until 1951. He attracted national attention for his program of disease eradication in Ohio. He wrote "Beekeeping for West Virginia" which was published in 1967, followed by W.A. Stephen, a University of Guelph, Canada student, who took over from 1963 to 1972. Larry Connor, current owner of WicWas Press, was briefly Extension Specialist in the late 1970s, before moving to Florida to manage a queen breeding operation known as Genetic Systems in 1978. This author was hired in 1979 at the same time as Jim Tew was employed at The Ohio Technical Institute in Wooster, who over time inherited the job, finally retiring and effectively ending the full-time beekeeping extension program. Both Jim Tew and I experienced the tragic situation where Winston Dunham died on March 31, 1980, quickly followed by W.A. Stephen, as he was dressing to go to Winston Dunham's funeral service.

Meanwhile the beekeeping research effort came from Iowa State University in the person of Dr. Walter Rothenbuhler. I wrote a reflection on Dr. Rothenbuhler that was published in the March 2003 *Bee Culture* **http://apisenterprises.com/papers_htm/BC2003/The%20Lasting%20Influence%20of%20Two%20Men.htm**

"Walter did a stint of commercial beekeeping in 1941 and 1942, where he worked first for Mr. S.E. Bailey and then Dr. Winston Dunham. This was an important phase in his career. Throughout his employment at both operations and two state universities as a premier researcher he always took time for reflections on the practical side of beekeeping. He stated in his June *1980 Gleanings in Bee Culture* obituary of W.A. Stephen, long time Ohio state beekeeping extension specialist, "Some of my most pleasant memories relate to Steve's and my traveling together occasionally to do his short courses." And in the same issue, in Dr. Dunham's obituary he wrote, "… he recommended that I get experience in a large commercial beekeeping operation…I have always been grateful for his guidance."

WALTER DIED IN 2002; BEE LAB WAS defunded in 2008. The research and extension program transformed into efforts by Reed Johnson and Denise Elsworth **http://u.osu.edu/beelab/** BC

CANADA Leads On Honey ID

Leonard **Foster,** Professor at University of British Columbia

Honey is the primary source of income for most Canadian beekeepers. Weather, the number of colonies in production and other factors have a big impact on the amount of honey produced but the value of that honey fluctuates across a much wider range. In 2014 and 2015, the farmgate value of all honey produced in Canada was approximately $210M but, in 2016, the same volume of honey brought in only $157M, largely because the bulk price of honey dropped precipitously. In a world-wide market, there are many factors that can affect commodity prices but one major concern is the volume of cheap synthetic or adulterated honey disguised as an authentic product, which can drive down honey prices.

Quality control (QC) analysis is essential to the safety of our food supply chain: without it, we might unknowingly eat toxins, pathogens or allergens, all of which can be life-threatening. Beyond basic health concerns, however, the public wants to know that it is buying the food it thinks it is buying. Food adulteration can take several forms and usually targets high-value foods, from tilapia being sold as snapper to corn syrup being sold as honey.

Mass spectrometry, nuclear magnetic resonance (NMR) spectroscopy and DNA testing are the most common techniques for detecting food fraud. DNA testing is largely not relevant for detecting fraudulent honey but NMR is widely used for this purpose in Europe and Canada has now been taking the lead on bringing this technology to North America. **True Honey** in British Columbia has an NMR instrument and has been trying to build a library of North American honeys, working closely with **Sweet Water Science** in Missouri.

Mass spectrometry is a complementary technology to NMR in that the two methods detect

different things, using very different properties of molecules. Mass spectrometry is widely used in other kinds of diagnostics, including food testing and detection of pesticide residues in honey, but the type of analysis required for detecting fraudulent honey uses a different approach. Rather than target specific compounds that distinguish honey from other products, we are developing a fingerprinting approach that looks at the patterns of all the molecules in honey. Similar to the NMR test, we are building a library of these fingerprints from North American honeys that we can then use to compare an unknown product against. This fingerprinting approach is low cost compared to NMR and the other applications of mass spectrometry, and has the added advantage that it is very hard to beat – in order for someone to get around the test, they would have to add together all of the components of honey in all the right proportions. And if you're going to go to the trouble and expense of doing that, why not just get bees to do it for you?

At this point in the development of this mass spectrometry test we are just evaluating how reliable and sensitive it is at detecting fraudulent honey, whether it is pure rice or corn syrup, or real honey cut with a fraction of syrup. With relative ease we can detect about 10% rice syrup in honey, which is the target we had been aiming for. Over the next several months, we will continue to refine the testing procedures, as well as the artificial intelligence algorithm used to analyze the data. In parallel, we are working with Peter Awram to collect honey samples from around North America to start building the needed library. We will be collecting NMR and mass spectra on all of the samples to understand where the relative strengths of the two methods are and when it might be appropriate to use one or the other, or both. BC

Are You Listening?

NOTES FROM THE BOARD

Apis M. **Mellifera**

We Have Emotions Please Pay Attention

The Board of Directors is delighted to see humans coming around to the realization that we honey bees have emotions. As far back as Rene Descartes (1596-1650) it has been argued that humans are unique in having the ability to close their eyes, picture a childhood home, determine whether it's safe to cross a river, and solve a myriad of problems by "thinking" based on trial and error. This is due to "consciousness," which research, according to **Wikipedia.com**, currently focuses on, "what it means biologically and psychologically for **information** to be present in consciousness – that is, on determining the neural and psychological correlates of consciousness. The majority of experimental studies assess consciousness in humans by asking subjects for a verbal report of their experiences (e.g., "tell me if you notice anything when I do this"). Issues of interest include phenomena such as **subliminal perception**, **blindsight**, denial of impairment, and **altered states of consciousness** produced by alcohol and other drugs, or spiritual or meditative techniques."

A recent study reports that social insects such as bees and ants have a large repetoire of behaviors that are required to construct 'elaborate' homes, defend against intruders, and provision the young with appropriate nutrition. However, they have long been looked at as simply "reflex machines," lacking internal world perception and/or ability to foresee the the immediate future. Characterizing these life forms in essence as, "tiny robots," is the default human position.

Fortunately, the authors of the resultant paper referenced above, entitled "Expanding Consciouness," (L. Chittka and Catherine Wilson, American Scientist, volume 107) are putting the above notions to bed, we hope for good. Like so many things, the idea of consciousness is much more nuanced than meets the human eye. In our case, of course, we possess a number of eyes, three simple and two complex. Humanity can't beat us in that department.

Among other things the study concludes we honey bees have a "dance language," enabling the ability to communicate the location, distance and quality of a food source to our sisters in a dark hive, who then have to make that information work outside the nest in bright daylight, without benefit of sunglasses. We have self-awareness, can build beautiful and serviceable houses (comb), know when to feed the young, and how to regulate their development to produce both female workers and queens as needed.

Beekeepers in touch with our "feelings" have noted that we honey bees can recognize them in the beeyard, and will give them more leeway in terms of employing defensive behavior. We are so close to some that it has become human custom to ensure we are informed when our beekeeper dies at the funeral. That way we can "grieve" this loss and realize that no longer will the same human be checking on us and assisting in managing the current state of our health.

At least one bee scientist has acknowledged us for our emotions. Dr. Zbigniew Lipiński wrote an entire book celebrating them (Essence and Mechnism of Nest Abandonment by Honeybee Swarms, published by the author 2001). **https://www.northernbeebooks.co.uk/products/lipinsk-iessence-and-mechanism-of-nest-abandonment-by-honeybee-swarms/**. The volume emphasizes one of our most celebrated behaviors, humans call swarming. "Nest abandonment" consumes a great deal of our time and resources, according to Dr. Lipiński, to ensure survival. Think of all the stress humans must go through in moving their residence. We ⇨

have many of the same issues, which he lumps into the honey bee "stress" category.

A wide range of factors causing nest abandonment are examined in the book, including: overheating, high concentration of CO_2, strong electromagnetic fields, old combs, comb removal, surplus wax foundation, improper bee numbers, bacterial diseases, hive beetles, hornets, termites, ants, strange smells, lack of forage, pheromone imbalance, congestion and overcrowding, mixing genotypes, and of course, the lack of nectar pollen and water. Note that the results of the above can be divided into two forms of "nest abandonment," that for reproduction and a separate type for survival. Humans call all honey bee nest abandoment "swarming," but generally they only see the reproductive variety. The lack of resources, especially water, is far more problematic for our tropical sisters, who must continually be on the alert for long-term drought and scarcity of food resources, prompting colonies to move at the drop of a hat.

In the temperate zones, this is not usually the case as our sisters there are often fixed in postion, unable to move due to colder conditions. Instead of leaving the nest, we are collaborating to store as much heat-producing fuel as possible. Once cold conditions set in, we are left to tough it out via clustering together, warming the colony until the weather breaks. That doesn't mean we don't abandon our nests if needed at other times, and for other reasons, but it is rare. However, the success of this endeavor requires a minimum population number to carry this off, and like our sisters in the tropics, we temperate bees are often right on the edge of survival.

The reproductive division of a honey bee colony clearly results in a "joyous" swarm for us. Few beekeepers witnessing a swarming event fail to join us in celebrating the happy occasion as half of us leave the nest in search of new horizons. But often they fail to recognize our sadness as some of us are forced to abandon our nest in less-than-opportune circumstances. The beekeeper can only share the emotion from afar because the end result is usually only noticed as an empty colony, or "dead out." We often wish beekeepers would join and support us during the emotional, unhappy process of abandoning our nest, often caused by extreme peril, known by beekeepers as "absconding."

On Drones

Few human beekeepers would like to be drones. This pejorative term follows male honey bees where ever they go. However, we are much less inclined to accompany humanity down this road. Unfortunately, most human research has not focused on drones, which have been described as "lazy" at worst, and "useless" at best. This state of affairs is rightfully questioned by Ernie Schmidt in *Bee Culture's Beekeeping*: *Your First Three Years*, Summer 2019: who asks, "why the above description is so readily and willingly accepted as scientific fact?"

His conclusions mirror ours: "The drone indeed has a single purpose and primary focus in life, to mate with the queen. The vast majority of drone scientific study is related to that behavior. However, he has been found to be a valuable member of the colony in other ways, earning his keep, by making significant contributions to colony life."

Thanks to beekeeper Schmidt for describing the drone's value. It is certainly clear to us how important our males are, the reason we generally keep some these guys around even during the off season. However, it is often not easy to distinguish such a time period, so like for any "aware" organism drones are a go-to strategy should things take a turn for the worse. Thus, we happily provide them with nutrition and allow them entrance into most colonies without screening. We know that they will not haul off our hard-won stores like sisters from foreign colonies are wont to do. And both them and the rest of us realize drones will often be called upon to provide a "quid pro quo" in return, ensuring the survival of the colony.

Certainly, we need drones to fertilize queens, their most celebrated job. Virgin, might be raised in an emergency. Unfortunately, this situation arises much more in colonies managed by humans, where queens are injured or even killed by unskilled beekeepers. Developing drone brood can also be a food reserve for the colony. Yes, they are canibalized for their nutrition, which then can be used by other adults to feed developing brood food, and perhaps even adults, to maintain colony health.

In extreme emergencies, drones give up their life to conserve colony food resources. They succumb to rejection by colonies during cold snaps, being denied entrance, which is usually a death sentence. They do the same when mating with the queen in the air at full flight, often climaxed with an audible pop. Their genital apparatus is often left in the queen, as the "mating sign," to be removed by our sisters. This has been observed by many beekeepers when queens returned to their nest, the rest of the drone's body having been discarded in the process.

Looking at the value of drones from another angle has a direct relationship to the first topic in this contribution, emotions. Beekeeper Schmidt calls this "The Happy Bee Theory." He maintains that honey bee colonies with healthy drone populations appear to produce more honey. The reasoning is that bees in a state of "homeostasis," are simply much more productive (happy?).

We agree. We work to get our colonies balanced with a low stress level so we can concentrate on the job at hand. For us, however, this means more than honey production, often the prime reason humans keep honey bee colonies in the first place, as revealed in Beekeeper Schmidt's conclusion above.

There is another worldview of the drone that fits here, according to Beekeeper Schmidt. "He is a diversion for predation on his worker sisters, being bigger (more 'juicy'), slower, noisier, congregating in groups and critically defenseless." He also quotes L.L. Langstroth on the concept, "that various kinds of birds are fond of bees, every Apiarian knows to his cost. The King-bird (*Tytannus musicapa*), which devours them by the scores, is said – when he can have a choice- to eat only drones."

Langstroth would be amazed at the current beekeeping envronment to know that this is now occurring in the brood. In many areas of the world, a major control method for the Asiatic honey bee mite (*Varroa destructor*) by beekeepers is using our males as a predator diversion, by encouraging queens to lay drone eggs in so-called "trap combs," that are then removed and disposed of. Female mites are more attracted to drone brood because for each cell infested, there is the possibiity of the mother mite having more of her offspring make it to adulthood.

Given their longer developmental larval period, we bees, therefore, have indeed been endowed with yet another potential benefit of our males. More will certainly be revealed as hman beekeepers continue to investigate our 30-million year history. BC

Bees Can Do Math!

Bees have very advanced communication skills

Dewey **Caron**

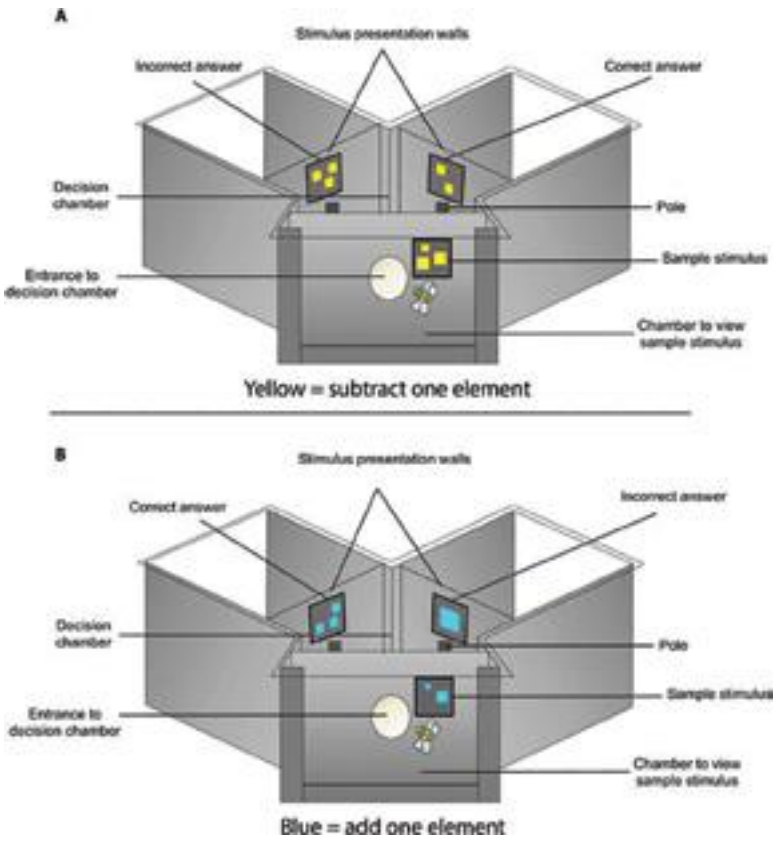
We know that bees have very advanced communication skills. They use chemicals in multiple ways in their dark smelly hive to communicate socially vital messages such as the queen is present, brood needs feeding, there is an intruder and much more. And their dance language communication directing foragers specifically where to go (direction from hive and distance to fly) and what they will find when there has been told and retold. Now a simple but elegant experiment by scientists from Australia and France illustrates that bees can do simple numerical skills of addition and subtraction.

Other animals have previously been demonstrated to also be able to add and subtract. Of course humans perfect that skill early in schooling. Our close primate relatives the chimpanzees, monkeys and orangutans, and birds such as African grey parrots and the ubiquitous pigeon have the ability to add and/or subtract. An Orb web spider has been observed to keep track of captured prey counts when researchers modify their larder (Rodriquez, et. al. *Anim. Cogn. 18, 307–314 (2015).*

Now honey bees join these animals as detailed in a study published in the February 2019 Journal Science Advances (*Science Advances*: Vol. 5 (2) **DOI: 10.1126/sciadv.aav0961**). This adds to research by Dyer and associates that previously have demonstrated that bees can be trained to recognize smaller and larger, with zero being the smaller number, and that honey bees can count in several studies, most recently by Skorupski, et.al. 2018, *Counting insects. Philos. Trans. R. Soc. B 373, 20160513.*

The experiment to demonstrate how honey bees use colors and symbolic representations to add or subtract involved 14 bees flying into a Y-shaped maze. The bees could obtain a reward (sugar) or punishment (quinine), depending upon whether they could add or subtract from the number of colored shapes they were shown upon maze entry. In the training phase bees would see one, two or four blue shapes or two, four, or five yellow shapes. The shapes could be either diamonds, circles, triangles or squares.

When the bees entering the maze were offered yellow shapes, the bees would need to choose the offering which contained one less shape to receive the sugar reward (See Figure 1). When a blue shape was offered the bees would need to choose to fly in Y decision chamber to where there was one additional shape than the entry number (Figure 2). Initial training was done of 100 replications. Shapes were alternated within the maze to eliminate bees from fixing on specific shape recognition or only right or left. During the learning phase, there was a significant increase in the number of correct choices as number of learning trials increased.



For the actual test, three yellow or blue shapes were used; three was never used in the training. Additionally, the actual test lacked sugar reward or quinine punishment (to eliminate further training). The test of the hypothesis that bees could add/subtract consisted of four replicates of two additions and two subtractions.

In the final test the bees PASSED. Selections were performed at a level that was significantly different from chance. In the words of the authors "Honey bees were able to use color as a symbolic representation of the addition and subtraction signs and learned, during 100 appetitive-aversive trials, to thus add or subtract one element from different samples (shapes)"

This experiment shows the ability of honey bee short term memory. They wrote in their abstract "In a free-flying environment, individual bees used this information to solve unfamiliar problems involving adding or subtracting one element from a group of elements". The authors believed that individual bees tested were not

Bees can be trained to recognize smaller and larger, with zero being the smaller number.

all performing the addition/subtraction in the same way – they stated that "Each individual bee appears to learn differently, possibly due to the random presentation of stimuli and by individual differences in cognitive abilities." i.e. some bees are brighter than others.

Discussion of the biological significance of this

experiment points out that solving the test of a previously unexposed situation requires two levels of information processing "The first is the representation of numerical attributes, and the second is the mental manipulation of those representations in working memory complex" This study did not investigate where in the honey bee brain this ability resides"

The authors conclude that their experimental demonstration shows bees can acquire and manipulate learned information to make decisions "using multiple memory phases". They suggest that for a forager to be able "to remember which flower traits (e.g., color, shape, and size) may provide essential resources and which flower traits may not "would be highly beneficial. At a minimum this experiment shows bees have multiple capabilities to account for their being such successful organisms, widely adapted to virtually all environments of planet earth. BC

HiveTracks
KNOW YOUR BEES

hivetracks.com

In the Beginning
The vision for Hive Tracks was born more than ten years ago in the Blue Ridge mountains of North Carolina, a region rich in beekeeping tradition, home to world famous sourwood honey, and one of the most biodiverse places on the planet. We dreamed of utilizing cutting edge technology to assist beekeepers in managing healthy and productive honey bee colonies.

The journey to make that vision come to life has been quite an adventure as we have broadly engaged the beekeeping community around the world, beekeepers of all kinds and levels, bee researchers, beekeeping suppliers, government and non-profit agencies, other bee technology and agtech businesses, and the public.

Together we have all contributed to making this broad vision a reality, though the lessons learned have not all been easy or as fast as one would hope. We believe much progress has been made, a strong foundation for the next ten years.

Current Status
The Hive Tracks team continues to hold to the original idea that collecting, maintaining, and analyzing basic information like records of inspections and events in bee yards is essential for beekeepers to make wise management decisions for their bees. Toward that end Hive Tracks currently delivers best-in-class, cloud-based software and bee data analytics solutions focused on honey bee health, beekeeping optimization, and the honey bee's direct connection to food production via pollination services.

Whether you have a couple of hives in your backyard or a couple of hundred in varietal honey production or several thousand colonies for honey production and pollination, knowing the current state your bees is critical to being a successful beekeeper, and Hive Tracks provides you with easy to use, reliable, cost effective, and trustworthy technology solutions.

Emerging Technologies
The impact of technology in the beekeeping sector is accelerating as the application of concepts such as internet of things (IoT) machine learning, and blockchain are introduced. The Hive Tracks' user community is well positioned to benefit from these new technologies which depend on the foundation of beekeeper data that Hive Tracks provides.

Hive Tracks is actively engaged in research and development in the emerging areas of honey authentication and traceability using blockchain, smart contracts for pollination services, and automated fulfillment of regulatory or reporting requirements like USDA, ELAP, food safety, and apiary registration systems. The potential benefits to the beekeeping community offered by technology are exciting to consider and pursue.

We invite you to join your fellow beekeepers and the Hive Tracks team as we positively impact the health of honey bees and the success of beekeepers worldwide. Visit our website, follow us on social media, send us an email, or stop by our farm for a visit to learn more.

james@hivetracks.com

All The Buzzzz in...

Bee Valentine Celebration

Bee Topper Treats

Surprise your friends with these special bee treats to add to lemon bars, cupcakes or cookies.

You will need:

- chocolate covered almonds
- yellow icing
- sliced almonds
- plastic bag
- scissors or skewer
- waxed paper or cookie sheet

Directions:

1. Color white icing yellow. You can either make the icing yourself or buy icing in a can or tube.

2. Punch a very small hole in the corner of a plastic bag by using a skewer. You can also clip the corner of the bag using a scissors but be careful to make the hole very small.

3. Fill the bag with icing and squeeze into the corner of the bag with the hole.

4. Place the chocolate covered almonds in a row on waxed paper or a cookie sheet.

5. Carefully squeeze two or three lines of icing over the almonds.

6. Pick up the almonds and move them to an icing free area.

7. Squeeze a small dot of icing on a sliced almond and attach to the covered almond to make wings.

8. Decorate desserts with your bee creations. These bees are resting on lemon bars. Instead of making lemon bars in a pan, make individual circles by using muffin tins. Baking time will be about half as long as baking them in a pan.

ooo Bee kid's corner

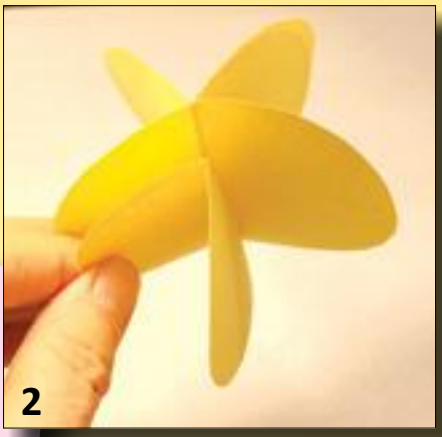
Produced by Kim Lehman -www.kim.lehman.com
www.beeculture.com
February 2020

3-D Valentine Bee

It's fun to make your own valentines for your family and friends. Instead of a flat card try making this dimensional sculpture bee card.

You will need:

- yellow construction paper
- black, red, and green construction paper
- tissue
- lid
- pencil
- scissors
- glue
- black marker



Directions:

1. Cut four yellow circles all the same size. Use a lid for a pattern. Fold each circle in half.

2. Make the bee body by attaching the circles together to make a kind of book. Begin by gluing half of a circle to the half of another circle. Add another circle. Add the last circle. It will look a little bit like a star.

3. Make a bee head by folding a rectangle piece of black paper and cutting an arch on the fold. Open the paper. One half will be the head and the other half will be attached to the paper so the head will stand up.

4. Decorate the head with heart shaped eyes and antennae. The antennae here are made by accordion folding two small strips of black paper.

5. Make bee wings by folding a tissue in half long ways. Make a twist in the center. Trim the corners.

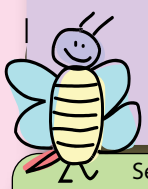
6. Write your Valentine message on the "pages" of your bee body.

7. Attach all the pieces together on a piece of folded construction paper. First glue on the wings, then the head, then the body.

Beecome a Bee Buddy

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

Name
Address
Age
Birthday Month
E-mail (optional)



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

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

Why Are Bees Stripey?

Mary **Montaut,** *Editor of The Irish Beekeepers Journal*

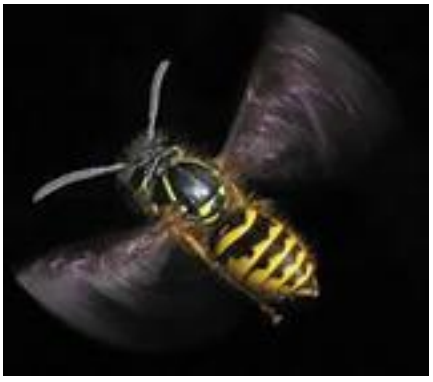
My eye was caught recently by a bizarre news item from Japan. It described an experiment where cattle owners (with black Japanese cattle) had painted white stripes on their animals making them look rather like zebras, and that this stripey effect had significantly reduced the number of insect bites the cattle received, when compared with the unpainted, plain black cattle. Of course, I am not concerned with stripey cattle, but the fascinating question of the stripes on bees and bee imitators immediately came to my mind. I have always found it rather puzzling that there can be such accurate imitation as, for instance, we find on the cuckoo bees which exploit the 'normal' bumble bees. Indeed, some species of bumble bees support populations of the invading cuckoo bees which look, and also smell, the same as their own queen before she was ousted or killed by the cuckoo queen. How do these imitators manage to 'copy' (if that's the word) their targets? As we are aware, honey bees are acutely sensitive to the scent or pheromone of their own colony, even to the extent of ejecting other bees of the same species which belong to a different colony and smell of a different queen's pheromones.

A slightly related news item in the BBKA News for November mentioned some new research by Professor Candy Rowe and her team at Newcastle University in the UK, identifying a possible advantage to being a stripey insect. Their work was on praying mantids, and they demonstrated that the predators actually find it more difficult to spot rapidly moving stripey prey: 'If you're stripey and move fast enough, then the blurring of the pattern can make it harder for the predator to spot you.' I believe that this is called 'the flicker fusion effect' and it confuses the predator's eye.

Realizing that the question of mimicry among insects, whether it is visual or pheromonal, is very complex, I began to look up all sorts of references to the subject. This led me straight back to Charles Darwin, who wrote that the mimicry discovered by his friend Henry Walter Bates among butterflies in the Amazon basin was 'an excellent illustration of natural selection.' Bates proposed that there was an evolutionary advantage for a harmless (non-poinsonous) insect if it looked like a poisonous (or very distasteful) one: he considered that this would decrease the predation on the insect which looked dangerous, but was not. This is now known as 'Batesian mimicry' and I will quote a plain definition from the Amateur Entomologists' Soceity website:

"Batesian mimicry is a type of mimicry where a harmless organism mimics a poisonous or unpalatable one. Predators learn to avoid the unpleasant organism and, because predators are unable to distinguish the mimic from the poisonous/unpalatable organism, the mimics are also avoided."

However, even before Bates had concluded his own research, he realized that there are also mimics of a different sort. These mimic other unpalatable insects, even though they are themselves unpalatable. This was proposed as a different form of mimicry by Fritz Müller, and again I will quote the plain definition given on the Amateur Entomologists' Society website:



"Mullerian mimicry is a type of mimicry whereby one or more species develop a similar appearance. Each of the species is either poisonous, dangerous or unpalatable to predators. Predators may only encounter one specific species but protection is conferred to the others due to their similar appearance."

Müller proposed that there are 'rings' of convergence which produce mimetic effects, and that this would be most advantageous for species which are less numerous than other members of the 'ring'. An evolutionary advantage would be conferred if they looked like the more common, unpalatable insect. [Interestingly, many of the 'unpalatable' qualities of insects are conferred upon them by their choice of food plant. For example, caterpillars can take up nasty tastes and use them to their own protection against predation by birds.] Müller saw that the less numerous species would be under evolutionary pressure to become more and more similar to the protective appearance of the more numerous species.

The question quickly became even more complicated and also controversial as Victorian entomologists took up the cudgels for one or the other type of mimicry. Bates himself was not convinced about the Mullerian 'rings'. Other problems arose when the researchers

began to look at 'imperfect' mimics: what degree of similarity might confer the benefit? Did the stripes have to match perfectly, or would an approximation be just as useful? And I added my own tuppence worth by thinking about the cuckoo bumble bees: they may look extremely like the target species. However, Dave Goulson comments that they 'often resemble their hosts in coloration. Most authors agree that this is probably not to aid entry in to the nest, but that the cuckoos and their hosts are members of a Müllerian mimicry groups.' [Dave Goulson, Bumblebees, 2010] Perhaps it may to be more important to mimic the pheromones?

A research project at London University 'wanted to test the idea that bumblebee species in the same location converge on a similar appearance to enhance protection from local predators.' Logically, they proposed that unusually colored bumblebees would suffer more predation than the usual ones. However, 'this is not what they found.' The research leader, Dr Nigel Raine, concluded, "Although birds can tell the difference between the color patterns of the different bee populations in our experiments, they probably find it hard to tell them apart in the fraction of a second when a bee flies past. Perhaps it's better for the bird to steer clear of all animals which look, sound, or fly like a bumblebee to avoid the danger of eating one." [Science News, May 2010] But a report on the Penn State University website maintains the original idea: 'According to Heather Hines, assistant professor of biology and entomology, bumblebees are distasteful to predators because of their sting and they mimic each other to avoid being eaten. "By looking like each other wherever they co-occur, bumblebee species enhance the warning signal to predators that they are distasteful," she said. "It reduces predation overall." '

The controversy continues, even though all points of view support Darwin's assertion that mimicry between species illustrates natural selection. But there is yet another point of view which disputes the utilitarian nature of insects' mimicry. This is almost an aesthetic argument, beautifully articulated by the novelist, Vladimir Nabokov, who was

also an eminent lepidoptorist and who has a species of moth named after him:

'When a certain moth resembles a certain wasp in shape and color, it also walks and moves its antennae in a waspish, unmothlike manner. When a butterfly has to look like a leaf, not only are all the details of a leaf beautifully rendered but markings mimicking grub-bored holes are generously thrown in.' [from Speak, Memory by Vladimir Nabokov] It is the perfection of the imitation which intrigues Nabokov, and for other entomologists it is the reverse - the very imperfect copy which seems to do the job. An example of this might be the extraordinary deceptions which are wrought upon ants in their nests, which are brilliantly described by E.O. Wilson in his book, Journey to the Ants (1995). The ants, like honey bees, are exemplary superorganisms, living in enormous colonies with castes. Yet, like bees, they have very small brains individually. As Wilson puts it: 'Ants are easily fooled.' They accept other species of ants which parasitise them. 'Many socially parasitic beetles and other insects, a majority of which are radically different in shape and size, have mastered the art of acquiring the colony odour or the attractive scent of ant larvae.' Like the cuckoo bumblebees, these invaders in the ants' nest induce the ants to feed and tend them as if they were their own! Of course, 'natural selection' has no particular preference for 'honest' mimicry (warning colours and stripes) over 'deceit' of this sort.

A point of view which seems to reconcile these difficulties addresses the idea of camouflage, rather than mimicry as such. The 'dazzle' effect, which I mentioned at the start of this Editorial, is important to this argument. The argument is that the strongly contrasted pattern (stripes, particularly) may in fact make the insect more visible to the predator, if the insect is stationary. In short, it may increase the risk of predation if the stripes show up strongly against the background and the insect is still. But, according to Benedict Hogan et al, ['Contrast, contours and the confusion effect in dazzle camouflage', Behavioural Ecology, October 2016] when the insect is in motion, the strong coloration and pattern confuse the predator and reduce predation. One may even suggest that this theory can carry the enthusiast from the sublime to the ridiculous. An article in Experimental Biology [February 2019] even went so far as to suggest: 'Striped patterns seem to work for humans as well, explaining why tribes from Africa, Australia, and southeast Asia have historical bodypainting traditions. When researchers painted a mannequin with zebra-like patterns, similar to those that adorn the skin of some tribal communities, they found that there were ten times fewer horsefly bites than on unstriped models.' Perhaps like the Japanese cattle?

A more common-sensical approach was taken by researchers into 'imperfect mimicry' [Nature March 2012, 'A comparative analysis of the evolution of imperfect mimicry', Heather D. Penney et al]. They found that 'predators impose less selection for mimetic fidelity on smaller hoverfly species because they are less profitable prey items' and they found 'a strong positive relationship between mimetic fidelity and body size. This supports the relaxed-selection hypothesis, suggesting that reduced predation pressure on less profitable prey species limits the selection for mimetic perfection.' I found it interesting that this team regarded 'evolutionary pressure' as variable with profitability. They also pointed out that the measurements were most often visual, which is practical for the study of bird predations on insects, and for human researchers who also rely heavily on

the sense of sight to understand the complexities of mimicry.

I was still more confused about the stripes by this time, and it was a relief to find a lucid article about stripey spiders: 'Function of bright colouration in the Wasp Spider ...' Alex A. Bush et al, Proceedings of the Royal Society B, March 2008]. 'There are two major competing explanations for the counter-intuitive presence of bright coloration in certain orb-web spiders. Bright coloration could lure insect prey to the web vicinity, increasing the spider's foraging success. Alternatively, the markings could function as disruptive camouflage, making it difficult for the insect prey to distinguish spiders from background color variation . . . our results provide strong support for the hypothesis that bright coloration in the wasp spider acts as a visual lure for insect prey and weak support for the hypothesis that the arrangement of the banding pattern across the spider's body disguises the presence of the spider on the web.' So the stripes may even attract the prey, and in any case do not seem to deter it! BC

Young Harris/Univ of GA Bee Institute

During my 20 years in the beekeeping arena, I've seen the birth of numerous local clubs, plus existing state and regional associations, burst at the seams with new members. In Georgia, when I was fresh on the scene, we had 18 local clubs, and one state association with 150 members. Today there are 46 local clubs and over 1,000 excited members of our state association. Now let's add up the number of meetings in just one year. In Georgia alone, there are roughly 465 beekeeping meetings, wow, that's a bunch of meetings! Most clubs want someone each month to speak on a topic, usually coinciding with a seasonal activity or something in the news. That puts a bit of a strain, not only on speakers, but also on club members to hunt down these speakers.

With this said, this may mean there's a bit of meeting overload in our state. Now, let's add up the rest of the nation's state and local clubs, plus the national meetings, and you are left with a ton of meetings. Guess you could say we are overly saturated with beekeeping meetings, which isn't necessarily a bad thing, just an observation.

There is one meeting that I believe outshines all the rest, the crème de la crème, numero uno, top drawer; the Young Harris/University of Georgia Beekeeping Institute. Of course, I am not biased, even though I work at the UGA bee lab that hosts this event. I've been to hundreds of meetings during my career and not that any were bad, I just think ours is the best. To be fair, let me give you a little background so you can decide for yourself. The Young Harris Beekeeping Institute was started in 1992 as an educational outreach of Young Harris College and the University of Georgia. Cofounders Keith Delaplane (UGA), Paul Arnold (Young Harris College), and Robert Brewer (Towns County, GA Extension) envisioned an event that would introduce participants to the rich beekeeping culture of the north Georgia mountains, offer a family get-away ambience and at the same time deliver an immersive experience in the most current state of beekeeping knowledge and practice. That recipe was an instant success, and within its first decade, the Young Harris Institute had expanded in size and became home to the Georgia Master Beekeeper and Welsh Honey Judge certificate programs (which I will go into more detail in next month's issue).

By far, most attendees come to Young Harris to soak up the matchless quality of instruction. The core of our faculty draws from a pool of expert beekeepers drawn from across the South. And when it comes to the science component – it is quite simply our goal to bring to Young Harris the most interesting bee scientists in the Western world. Guest lecturers over the years have included U.S. luminaries such as Tom Seeley, Marla Spivak, David Tarpy, and Jeff Pettis – but also international guests Ernesto Guzman-Novoa (U Guelph, Canada), David De Jong (U Sao Paulo, Brazil), Giles Budge (Newcastle U, UK), Yves Le Conte (Avignon, France), and Francis Ratnieks (U Sussex, UK). On schedule for 2020 is Jerry Hayes, Dr. Kirsten Traynor and Professor Robin Crewe. In short, one would have to attend an event such as Apimondia or the Entomological Society of America to hear such a wide range of beekeeping expertise. But it's available every year at Young Harris, Georgia. Because of our guest speaker's interesting background, I would like to give a bit more of their background as opposed to just a one paragraph bio. Let's begin with one of my bosses, Jerry Hayes, new editor of *Bee Culture* magazine.

Jerry's introduction into bees was back in the day when bees weren't very popular or talked about much. When beekeeping was more of a novelty, and few were involved, his interest began when a co-worker started a conversation about his hive. This peaked Jerry's interest and he started in with the questions. Next, he began to read all he could until his first hive arrived. Jerry explained that he evolved into the typical backyard beekeeper, tinkering with this, and building that. He soon fell in love with bees and beekeeping and thought seriously about how he could do this for a living. The answer came to him simply enough, it was time to go back to school.

There were a few apicultural academic arenas to choose from but he decided to train under the direction of Dr. Jim Tew at Ohio State University. Once the decision was made, he and his very patient wife, packed up their young son and headed north to Wooster, Ohio. Jerry said it was the best decision he has ever made since working with Jim was such a wonderful experience. He explained that not only was Jim extremely talented and knowledgeable in all that is bees and beekeeping, but he was also fun - which is a unique talent in the world of science. If you've ever had the opportunity to attend one of Jim's lectures you understand. He is the Steve Martin of the beekeeping world.

After finishing, Jerry moved back south to work at the USDA lab at Baton Rouge. While there he worked on ways to ID Africanized honey bees using morphometrics. He pulled many a leg and wing off

Jennifer **Berry**

many a bee to come up with the data needed to correctly distinguish between European and Africanized honey bees.

Even though he enjoyed working for the USDA, one day, out of the blue, he got a call from Dadant offering him a job as a branch manager. He was ready for a change (and a bigger paycheck), so he and his family headed north once again, but this time to Wayland, Michigan. He was there for only a year when the company relocated him to their home office in Hamilton, Illinois. Here he remained for 18 years and his job eventually morphed into more product development and testing, which he enjoyed. While there, he started a Q&A column in *American Bee Journal*. He wrote "The Classroom" for 35 years, just retiring in 2019. He told me how much he loved the column and he learned a ton because sometimes, he had to research the question before he could give the correct answer. I asked what his favorite question was and he said, when a gentleman asked if it was ok to feed his bees marshmallow peeps, you know, those yellow, puffy disgusting candy items sold once a year around Easter.

While still at Dadant, he heard that Lawrence Cutts was soon retiring from the apiary inspection job in Florida. Missing the south and his father, who was just diagnosed with ALS, he thought this would be a good time to move back to Florida. He figured he didn't have a chance at the job, but was still motivated to apply. Thankfully he did, since he got the job as the Florida Chief of Apiary Section for the Florida Department of Agriculture and Consumer Services.

Jerry Hayes

One good part of his job was the close proximity to the University of Florida and to Dr. Jamie Ellis' office. Due to the closeness, he and Jamie began to share ideas, one of which was about RNAi. They both wondered how this new technology could possibly be used to control varroa. After some research, they discovered a company in Israel was already testing this new technology. So, they started informally collaborating with Beelogics.

Soon Monsanto got wind of RNAi and wondered how this could not only benefit agriculture but also the beekeeping industry. After nine years with Florida department of Ag., Monsanto came a calling and offered Jerry a position, which he accepted. He took the job because he truly believed he could not only tear down barriers between the beekeeping industry and Monsanto but also help bees. With the weight of Monsanto backing RNAi, there was a chance it could become a reality.

Unfortunately, delivering RNAi was extremely difficult, hence the project became dead in the water. That's when Jerry decided to move on and went to work for Vita Bee Health until a completely different offer came his way.

Kim Flottum, previous editor of *Bee Culture*, had mentioned a few years prior that he was getting close to retirement and A.I. Root would be looking for a new editor. Kim suggested that Jerry should consider the position. He thought about it but figured there were way too many folks more qualified that would want the job. But when it came down to it, he was the one most qualified.

So, there you have it, our new editor of *Bee Culture*, Jerry Hayes. He has big shoes to fill, which he said himself, since Kim has been at the helm for over 30 years, but Jerry's never one to side step a challenge. He's just now getting his feet wet, but with his years of experience and background, I think A.I. Root made a great decision and so did we for inviting him to speak at our institute.

Meet Dr. Kirsten Traynor. Her interest in bees came quite by accident when a local beekeeper established colonies on her property. She soon became enamored with the colonies' activities and loved the flavor of fresh honey but even more, she enjoyed having the bees nearby. Then one night, the beekeeper quietly and without notice, removed the colonies and hence no more bees.

But, but, but, wait, this couldn't happen! She immediately missed their presence. That's when she realized she was hooked and needed more bees. Kirsten decided to take matters in to her own hands this time and attended a beekeeping short course. While there, she won the prize raffle, a hive body. This was only the beginning, next she ordered bees and as with most beekeepers, one hive becomes two, two becomes four, four becomes 40 and next your life in completely immersed in the wonderful world of honey bees.

Kirsten wanted to combine her love of travel and her fascination with bees, so she decided to apply for the German Chancellor Fellowship. The fellowship works with university graduates from China, Brazil, Russia, India and the US. Only ten students from the U.S. are selected for this prestigious award and Kirsten was one. She traveled throughout Western Europe studying the difference between European and American beekeeping and bee breeding. She traveled over 50,000 miles and wrote some 50+ articles for national and international magazines chronicling her adventures. During her time there, she also interviewed scientists and medical professionals in order to gather information for her book, *Two Million Blossoms: discovering the Medicinal Benefits of Honey*.

Once back in the states, she decided to continue with this passion for bees and take on a new challenge: a PhD in Biology under the direction of Dr. Rob Page at Arizona State University. However, this was no easy task since her undergraduate degree was in English from a small liberal arts college. Biology, chemistry and ecology were courses foreign to her. So, before she could start, Dr. Page required she pass the GRE Biology Subject test within one year. She did with flying colors and was off taking courses and collecting data for her research. While in grad school, she received a French Fulbright Fellowship and examined the effects of brood pheromones and how bee larvae manipulated caregivers in Dr. Yves Le Conte's lab in Avignon, France.

After graduation she moved to Maryland and became a post doc at Dr. Dennis vanEngelsdorp's lab. While there she studied the sublethal effects of pesticides, primarily fungicides, on honey bees. Kirsten also worked on the APHIS National Honey Bee Health survey, which looks at the overall health of our honey bees in the US.

Kirsten's other love is writing. Combining this with bees has led her to several editing positions. From 2015-2017 she edited *Bee World*, a quarterly magazine that is dedicated to all bee species. And from 2017-2018 she edited *American Bee Journal*, (the other bee magazine that we don't mention here at *Bee Culture*, shhhhh..;).

Her passion for writing and bees finally culminated into her latest project, *2 Million Blossoms*, a new quarterly magazine that is devoted to protecting our pollinators. The timing for this magazine could not be more perfect. If you don't know by now, our pollinators (and song birds) are in trouble. We've seen up to an 80% decline in our insect biomass over the years, and consequently, a huge decrease in our insect eating song birds as well. We can contribute this to the loss of habitat (6,000 acres/day), pesticide poisoning and the politically charged, climate change. *2 Million Blossoms* is not only dedicated to making people aware of these issues but also providing information on how they can help. Most of us have heard we need to encourage populations by planting food plants, but what does that mean exactly to the non-beekeeper, the non-environmentalist, or the non-gardener. If the average person even hears ways to help, do they know how too? That's where *2 Million Blossoms* will step in.

Kirsten's hope for the magazine also includes bringing folks together. There's been a growing divide between native bee specialist and advocates and the honey bee community. One, because honey bees are technically not indigenous to the Americas. Yet we do have fossil evidence that they were here millions of years ago, just not recently until the pilgrim's brought them over. The argument remains that honey bees, not from here, may be displacing our native bee species.

Also, even though we are seeing a huge decline in honey bee populations, both feral and commercial, they are not going extinct as some of our native bee species are. This magazine will also provide a platform to have a lively discussion about not just honey bees but all bees and other pollinators as well! Now if you weren't impressed enough by this incredibly talented woman, here's more. She's never left the world of beekeeping. She still manages an apiary in Maryland where she produces top notch nucleus colonies and queens.

Kirsten Traynor

As you can see, we have two amazing guest speakers that both bring to the stage decades of knowledge from the scientific to the applied. I've had the privilege of seeing them both speak, which not only are they well versed in their subject, but entertaining too. You won't want to miss either of them. Like I mentioned before, the beekeeping institute is not your ordinary meeting. We bring together a whole host of folks that bring with them information that you're not normally exposed to. But wait, there's more. We have also invited Dr. Robin Crewe which I will highlight his work and important research on one of the most serious beekeeping perils lurking beyond our shores – the socially parasitic cape bee of South Africa, *Apis mellifera capensis*. The institute is May 13-16th at Young Harris College. Please visit our website for more information. **www.ent.uga.edu/bees**

Quick side note:

As I was doing a little research for this article, I went to the *2 Million Blossoms'* website and on the home page, Kirsten describes the Windshield Effect. What a coincidence, since I had already planned to share this quick account of a recent trip even before I read what she had written. Here's my account of the Windshield Effect, and you can go to the magazine's home page and read what she wrote.

This past Summer my mom and I drove from Athens, Georgia to my grandparents' farm outside of Holden, Missouri. We took two days up and two days back to travel the 1,744-mile round trip journey. It didn't even dawn on me until we were on the last leg of the trip. While filling up the gas tank just miles from home, I looked at the windshield, and then the front of the car. There was only one insect casualty smeared on the front bumper, and nothing else. What???? In almost 1,744 miles, NOTHING but one bug! I remember driving this same passage in summers past and having to stop numerous times each way to scrape all the dead critters off the windshield. But not now. Sad! BC

Off To A Bee Meeting

John **Miller**

Why do we fly/drive/bum a ride with another fellow traveler to a bee meeting?

Bee meetings are unique and not unique.

Every Bee meeting like every Almond meeting, like every Buffalo meeting, Cut Flowers, Cherry growers meeting has similar features.

The Organizers – who - a year ago fretted over the meeting.

The Speakers – who devote about an hour in preparation for each spoken minute.

The Audience – who vote with their feet for the upcoming speaker/presentation.

Does the audience, the group in focus today, attend a bee meeting to be entertained?

Or do we attend bee meetings to be informed?

We love a good talk.

We love a good story-teller.

Jim Tew

Some of the best talks are stories, told by people like James Tew – the Garrison Keillor beekeeper. Another great storyteller is our Florida friend, Jamie Ellis.

These guys do hours and hours of preparation, pulling on deep beekeeping experience. Researchers who may be for the *First Time* presenting years of work in a 30-minute segment angst over "Will anyone be listening?"

Listening to one of these masters, we take notes as fast as the hand allows, while our entertained-brain is fixed on the 'shotgun swarm capture method' as explained by Jamie Ellis. We can't stop laughing because every one of us has done something similar – something in our Darwin Award winner beekeeper career.

We share experience.

We also attend bee meetings to gossip; learn what's up with prices down?

Jamie Ellis

What's new? – see friends we very rarely see – the informal attendance.

We invest our own 'bench time'; time spent in our own labs – which may be ESPN; or it may be *Honeybee Democracy*, by Dr. Seeley; or it may be a beekeeping periodical – we all get the same 24 hours per day.

How do we use our bench time hours?

Some of us go to bee meetings; and enjoy them. We meet new people. We are exposed to new ideas, new devices – 'Do you think that Combplex thing will really work?' Do we really have fungi lethal to mites – that we can use?

Some go to bee meetings to invest in the industry. Liz Vaenoski wore out her old car thousands of miles to give away time and treasure to bee meetings; often buying back her own donated items – because she so cared for our industry. Thanks Liz: Great Example.

Some attend bee meetings to support a cause. Funny Hunny is a plague. Forage, Flowers, Food for birds and bees and butterflies is in short supply. Bee populations crash, so do Butterflies. What can be done? We have lots of well-intended, underfunded groups seeking our bee meeting attention and dollar.

Why do you attend bee meetings? BC

Pesticide Ignorance

Michele **Colopy**

Last year at a state beekeeping conference an academic researcher discussing bee health stated "glyphosate does not harm bees." When questioned by a beekeeper pointing out the loss of forage, and the findings of glyphosate in honey and the impact upon the bee's gut microbiome, the researcher said they misspoke and meant to say "neonicotinoids do not kill bees." Why would an academic researcher state such misinformation about plentiful and peer reviewed research about *both* pesticides? The label for neonicotinoid pesticides clearly states it is a bee toxic pesticide.

I was challenged by a university Extension agent who claimed he had not read any pesticide label that states bees die from pesticides. He questioned the "labels" I was reading, and even stated the Safety Data Sheets for pesticides do not contain information about the toxicity to non-target organisms. Safety Data Sheets are compiled by the manufacturer and reflect the research they conducted relating to the impact upon non-target organisms from their pesticide. For what reason, then, would an Extension agent promote ignorance about Safety Data Sheets? This kind of misinformation, their agent's pretense, puts into question the veracity of academics and Extension agents.

Let's examine the labels. The pesticide manufacturer must create a label, under the guidance of the EPA, which becomes federal law. The National Pesticide Information Center provides important information on pesticides. If you can't get to your computer, there are phone apps to provide you with vital information about pesticides:

Gateway on Pesticide Hazards and Safe Pest Management **https://www.beyondpesticides.org/resources/pesticide-gateway**

Pest Smart app **https://www.pesticideresearch.com/site/overview/tools/pri-pesticide-product-evaluator-app/**

Pesticide Applicator apps **https://pested.osu.edu/PrivateApplicator/apps**

National Pesticide Information Center apps **http://npic.orst.edu/webapps.html**

Spraying of Pesticides app **https://phys.org/news/2012-11-insecticide-app.html**

Safety Data Sheets free online search **https://chemicalsafety.com/sds-search/**

If you really want to startle yourself about the risks of using pesticides, *read the directions for washing the clothes you wore when applying a pesticide* **https://ag.umass.edu/fruit/ne-small-fruit-management-guide/appendices/tips-for-laundering-pesticide-contaminated-clothing**

Read the labels before you buy; especially before you use any pesticide: outside of your hives, and, inside of your hives. The purpose of a pesticide is to kill. Understand the impact of pesticides to the health of your bees. Be knowledgeable and pro-active to protect your bees and yourself.

As beekeepers working to protect our bees and native pollinators we must advise researchers and Extension agents when they talk out of turn about pesticides. We must question pesticide applicators and others when they mix a fungicide with an insect growth regulator: bees are

insects too! As beekeepers we must work with our growers and pesticide applicators to read pesticide labels, understand the research showing new chemistry is created, thereby increasing toxicities when pesticides are mixed together.

The impact of pesticides to our bees is not from insecticides alone; nor is it from herbicides decimating pollinator food sources and a bees' gut microbiome. The true harm happens when we ignore science, when field observation is ignored, when the farmer and beekeeper stare at a hive filled with dead, dying, and quivering honey bees and the cycle is repeated the next year, in the same field, with the same crop, with new hives (if the beekeeper is still in business). Researchers, Extension agents, and beekeepers must acknowledge what research tells us about the impact of pesticides to beneficial insects and plants.

Ignorance is the lack of knowledge or information; pretense is a claim "made or implied, not supported by fact." Ignorance and pretense can both be remedied by fact and science. Get the facts, implement the science, protect your bees. BC

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Read the Label First: Protect Your Garden by the EPA **https://www.epa.gov/sites/production/files/2016-02/documents/garden.pdf**

OSHA poster from **https://osha.theoshastore.com/ghs-pictogram-poster.html**

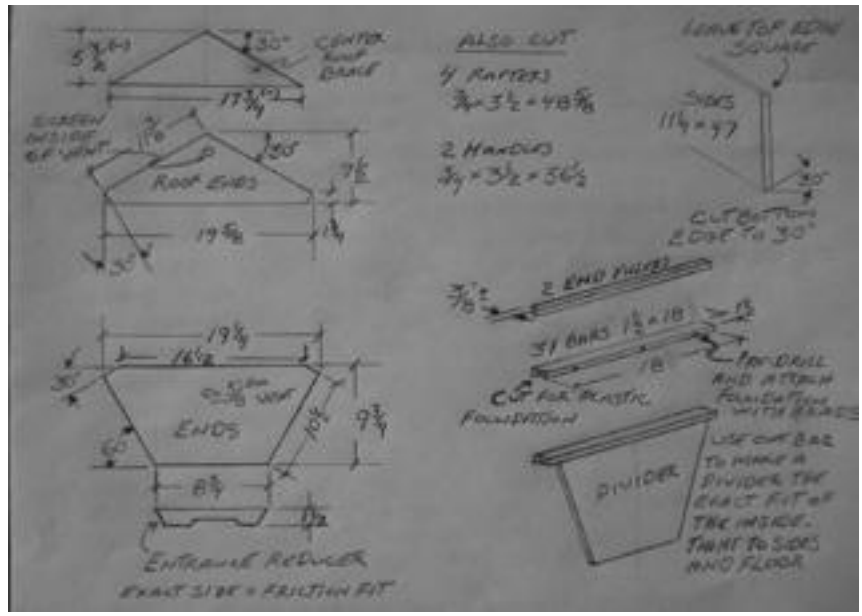
HORIZONTAL BEEKEEPING

Tina **Sebestyen**

My first mentor was a commercial beekeeper, so I learned Langstroth style management, but it was a Kenyan top bar hive that really got me started in beekeeping, and I still love horizontal beekeeping best, after all these years. I chose the Kenyan top bar hive because it would be in my dad's backyard, and I wanted something that looked like art, and wouldn't scare the neighbors. I have since discovered that there are other great benefits to top bar or horizontal beekeeping. One is that there is much less equipment required, everything is right there. I keep a follower board and queen excluder under the lid when they are not in use. For traditional Langstroth hives, an entire shed full of extra hive bodies, frames, tops, bottoms, feeders, entrance reducers, and a million other things, is needed.

Another wonderful aspect of horizontal beekeeping is the greater flexibility of the hive itself. One of the reasons extra equipment is unnecessary is the fact that a split can be made on the spot, simply by placing the follower board and moving the old queen or queen cells to the opposite end of the hive. Of course, once the colony grows to full size, they will need a new home. But suppose the virgin queen does not return from her mating flight. The follower board can be removed, and the bars slid to the back of the queen-right colony to re-combine.

The Kenyan top bar hive can be built from plain old lumber. Sometimes what is needed can be found leaning against the barn, for nothing. Here in the U.S., we call this "dimensional lumber", which means that each board has been straight-lined and cut to a certain size, or dimension. This makes building a top bar hive something that can be done without any fancy woodworking tools. It is also



one reason top bar beekeeping has been done the world over for so many years. A top bar hive can be built almost anywhere with nothing but a hand saw and some nails. There are even top bar hives built out of sunflower stems tied together and grouted with mud.

One reason so many people are becoming interested in top bar or horizontal beekeeping is the fact that there is no lifting required. In Langstroth beekeeping, the hive bodies must be un-stacked and re-stacked every time an inspection is done, and this is most important in late Summer when the *Varroa* populations must be monitored and treated before Winter fat bees are born, just when there are multiple heavy supers to remove. A full deep can weigh almost 100 pounds, while full medium supers are "only" 60 pounds or so. In top bar beekeeping, the only thing to lift is the roof, and even that can be hinged to the hive body.

Natural comb is a wonderful result of top bar beekeeping. Store-bought beeswax is commonly contaminated with pesticides. In top bar beekeeping, the bees build their own. When bees build their own comb, they build a lot more drone comb, and raise a lot more drones. This can be a big advantage if drone culling is done, or a big disadvantage if mite numbers are not monitored, are allowed to climb, or culling is not done. It is nice to keep bees in a way that allows them to do things the way they want to do them. It is also much easier to conserve and move queen cells when they are built in natural comb rather than on foundation. Typical top bar management helps keep old black comb from infecting our bees with brood diseases that lurk in old cocoons.

There are also some disadvantages to top bar beekeeping, some of which can be overcome with better design than has sometimes been used in the past. Top bars typically have a short wooden spline inserted in the center, to give the bees a guide to anchor their comb to. The fact that the spline is fairly short means that the bees can easily ignore it, and build what is the bane of top bar beekeepers, cross comb. Cross comb can go in any direction the bees wish, often at 45° or even 90° against the direction of the bars. This means that all the bars are connected to one another, and the colony cannot be inspected. Another disadvantage to the wooden spline is that it is not a very positive anchor for heavy honey comb. In hot weather, the comb can fall off quite easily. If inspections are done when comb is new and fragile, and the weather is warmish, full honey comb can fall to the bottom of the hive. This is a real mess to clean up, and a major bee killer. These disadvantages are easily overcome by replacing the wooden spline with one made of a one and a half inch strip of plastic foundation, which is both a very positive foundation, and also tall enough to really encourage the bees to build comb in the direction we humans would like them to. The bars should be 1-3/8" wide to give proper bee space for the comb.

A commonly used top bar design attempts to keep honey comb from getting quite so heavy by making the hive body shallow. This is a big disadvantage to the bees. They need enough vertical space to raise brood, with a good pollen band, and a thick honey band above the brood area. Faced with limited vertical space, the bees reduce the size of the pollen and honey bands in order to maintain a proper brood nest. In winter, the cluster easily consumes all the honey they are in contact with,

Attach the handle. See how the handle captures the ends of the bars and creates a bee-tight space to eliminate robbing.

and must move more frequently. If not possible due to prolonged cold, freezing from starvation is the result. This disadvantage is easily overcome by building hives with greater depth top–to-bottom, which we can now do because our honey combs can get as heavy as they need to be without falling, due to the positive spline on the top bar.

Some thought also needs to be put into the typically designed entrance, which has been three or four holes drilled in the side of the hive. Unfortunately, the ability to use an oxalic acid vaporizer is eliminated by the entrance holes. A better design leaves the entrances on the ends of the hive. This allows the vaporizer to be used, and also allows the use of Boardman feeders. It is very important for the entrance to be at the end of the hive, rather than in the center. The bees like to put their brood chamber near the door, and the cluster starts winter on the brood chamber. If they go into winter in the middle of the hive, they follow the honey bars to the end of the hive, and never realize that half of their honey is stored on the other side of the brood chamber. They just cannot travel that far in winter. The bees must begin winter at one end of the hive, and follow the honey from bar to bar, contiguously to the other end of the hive.

A traditional top-bar with wooden spline, and a better top bar with a 1½" piece of plastic foundation. Wax foundation will not work here, it deforms under the heat of festooning bees.

Top bar hives are built in a triangular shape to help keep the bees from attaching the comb to the hive wall too much. The angle we use is the same one the bees use in their hexagonal cells, 120 degrees. Using this same angle means that we are making it easy for the bees to conserve space and energy in comb building. However, if the wooden spline is still used in the top bar, the bees will still attach the comb to the walls very well, to help stabilize what they know is fragile comb. The plastic foundation spline relieves them from having to strengthen the comb by attaching it to the walls.

Now that we understand why the top bar hive should be built in a certain way, let me show you how to build one. I designed this so that commonly available dimensional lumber can be used. If you own a table saw, you could build the hive from exterior grade plywood, but it is a risk. Plywood contains formaldehyde, a bee killer. It is usually off-gassed enough by the time we can buy it, but maybe not, too. To be safe, I use untreated wood. Spruce and pine are commonly available, and are both lighter woods than some, and so help keep the hive from becoming too heavy.

At the lumberyard, choose the flattest and straightest boards you can find. When you look down the length of it while holding it horizontally, check to see if the board is cupped from side to side. Then hold the board vertically, look down the length, and check to see if it twists from one end to the other. At home, our first job is to cut the pieces to length. There are usually cracks in the ends of boards, called checking. Cut off enough of the first end to get past any checking, making sure that you cut the end square. Measure the correct length, mark, and cut the first side. Measure and cut the second side to length checking against the first one. Draw the outlines of the two ends, and cut them, again checking them against each other. Cut the two triangles that form the ends of the roof. Then cut the two hive handles and the four rafters.

To assemble, lay one side on the workbench, and hold one end against it, with water-proof glue (use Titebond II, not Gorilla Glue or expanding glue) on the seam. Pre-drill and screw through the end and into the side, in at least three places. Attach the other end in the same way. Lay the other side on the bench, turn the hive body, and screw the second side on. Attach the full length handles on each side, even with the angled cut on the end, again using glue and screws. Turn the hive body upside down, and attach the two halves of the bottom with piano hinges. Be sure to leave enough clearance to the center stabilizer that it is easy to open the bottoms. Assemble the roof. The ends of the roof go on the outside of the hive body, and the lowest two rafters rest inside the handles, creating a bee-tight space around the top bars. For free plans, please visit my web site, **beequest.buzz** or email me at **bee.seeking@gmail.com**.

Although any new hives I build for myself will be long Langstroth hives, I do not plan to abandon my top bar hives. I have a lot of them, and really love top bar beekeeping. Future articles in this series will address ways to rectify problems with incorrectly built top bar hives and bars, installing a new package, splitting, comb management, and simple queen rearing. These articles will apply to long Langstroth beekeeping as well. BC

Tina has been keeping bees since 2007 in top bar, Langstroth, and more recently, the long Langstroth hive. She learned beekeeping from wonderful mentors, "old guys", as well as through mentoring as founder of the Four Corners Beekeepers Assoc. She is vice president of the CO State Beekeepers Assoc. and is currently working to produce the Master Beekeeper Program for the state of Colorado. She helps with large scale queen production for commercial operations, raises locally adapted queens for SW Colorado, helps produce nucs, does structural removals of bee colonies, and writes and speaks about bees everywhere she gets the chance. She can be reached at ***bee.seeking@gmail.com***

What Are They Doing?

I need to get my bee suit on!

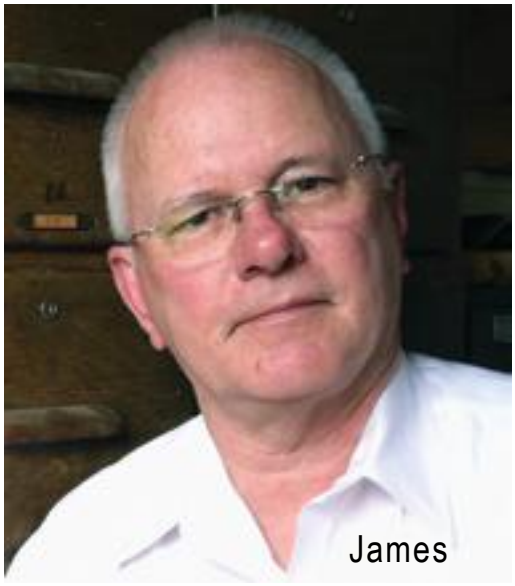
Crazy Corn Dust Foragers – or maybe not

Last Spring, as I have seen so many times before, there were honey bee foragers in the cracked corn bird feeder that my neighbor had hanging from a low Pine limb. Many times, said by someone like me, with a confident air, *"Well, you see, those early foragers are desperate for anything that resembles pollen. Corn pollen and corn dust do not provide a complete amino complex for protein construction for honey bees."* Essentially, these eager foragers are simply screwing up – right?

In my experience, anytime I say that the bees are doing something really crazy, that is my cue to seriously rethink my opinion at that point. Foraging bees have been seen on such things as coffee grounds, decaying mulch[2], drain holes in plant pots and water from feedlot runoff. Ugh. Normally, the bees have a reason for everything. Are these corn foragers off the pollen mark?

The photo shows a corn dust forager with a forming pellet in her pollen basket and an exposed Nasanov gland. She doesn't seem to feel that she is making a mistake. A short publication from Michigan State University Extension reported, "The bees collect the pollen-sized seed dust particles and ***yeast*** *that are found in the cracked corn and other seeds[2]..."* Without any supporting science, I ask if the corn-dust-foraging bees could be collecting yeast more than corn dust? This opens a huge door to nectar manipulation by bees, production of bee bread, population of bees' gut flora, larval digestive needs and, much more. No, these foragers are not making mistakes and no, I do not know exactly what they are doing.

[1]See short, shaky video showing bees foraging on decaying mulch at: https://youtu.be/HFjuy_CZtSg



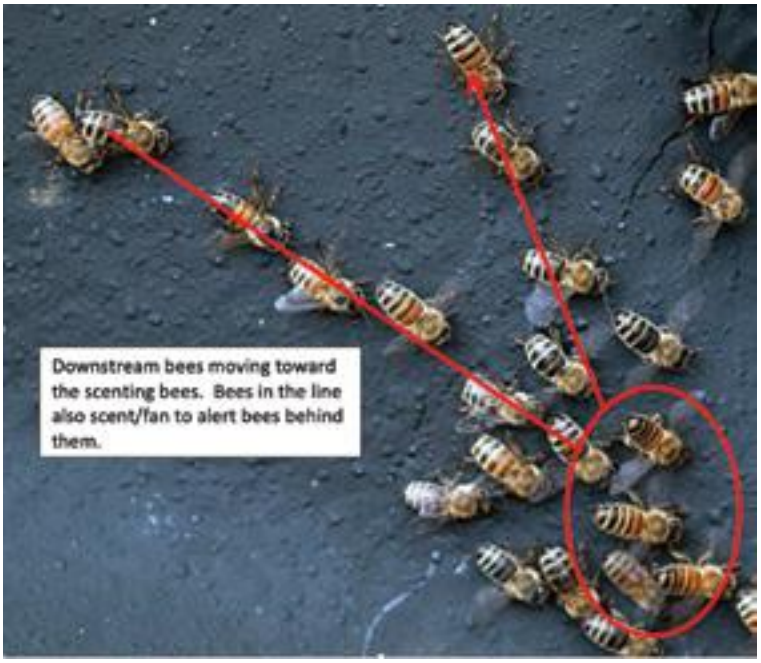
What unusual sources have you seen bees apparently foraging on?

The Scent Gland – *Nasanov's* Gland

The scent gland has myriad uses. Beekeepers see bees using this gland throughout various bee management procedures. But this gland, in use, is especially exciting to see when hiving a swarm. The odor of the Nasanov secretion is sweet, like fresh straw, and distinct.

Queens scent, too. In the photo, only her abdomen is showing, but her retinue is distinct.

[2]Hungry honey bees visiting bird feeders. https://www.canr.msu.edu/news/hungry_honey_bees_visiting_bird_feeders



Getting a new bee suit is like getting new clothes. Treat yourself. Ask for one for your birthday. Don't worry about the smoker soot or the propolis. A suit that has withstood the bees is a good-looking piece of equipment.

The right bee suit for a day in the apiary?

I have a buttload[3] of bee suits. I am mostly happy with all of them. I bought some while others were gifted to me. On different days and for different tasks, I like protective gear that meets the need. Unless working at night while relocating colonies, I rarely wear gloves. There are no gloves that do not make the beekeeper clumsy. Commercial beekeepers are exempt.

Hot days, for a light beeyard task, a light veil, sometimes not even tied, is enough. Recently, during mid-November, I donned a heavy, coarse twill jacket with attached veil. I wore this suit for the cool temperature as much as for protection from the bees. For photography or video work, I frequently wear a Sherriff half suit (sage colored). It's a light weight jacket with large pockets that I can tuck into my jeans. For meaningful bee work that requires having the suit on for a while, I wear a Guardian Jacket ventilated suit with a veil front that unzips open without removing the entire screen veil. I presented photos of this suit last month in *Bee Culture*. During the last 30 years, I have not worn full suits very much. I did wear them when I was in Africanized bee areas. Heavy pants, like jeans, meet my needs.

Gets your attention – Right?

Thanks for reading and viewing

Yes, there is a format change going on here. I hope you will give me some time to make it work for both you and me. Regardless, I always appreciate your time spent here. I know you could have been somewhere else. BC

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

https://youtu.be/hB-4iVrA_tw

A video chat

[3]Buttload is an obsolete noun, usually English, Southern US, or New England. A buttload is 48 bushels, equivalent to 384 gallons. A butt was a heavy cart. The whole thing was a buttload.

Comb And Frame Management

It All Depends On Beeswax Comb

David **MacFawn**

Beeswax comb is the building block for the colony. As such, frame and comb management are important to good beekeeping. Frames and comb from both the brood chamber and honey supers need to be well maintained. The beeswax comb is used to raise brood, store pollen, and store honey.

Bees normally devote 14 to 20 percent of their comb area to drone cells (17 percent is the average). When comb is salvaged that has holes, bees will normally fill the voids in the comb with drone cells since there are typically not enough drone cells in modern hives. When foundation (used in frames to get the bees to draw-out cells of a certain size in the frame) came out, all the cells in beekeepers' hives were worker-size cells since it was thought more workers translated into more honey.

In recent years we have found that drone cells only marginally impact honey production. In order to know if a comb is salvageable, determine if it is a brood comb or feed-chamber comb with more than 1/8 to ¼ of the comb missing due to wax moths. if less than approximately ¼ the comb is damaged the comb can be reused, but if more than ¼ damaged, then the beeswax comb should be salvaged and the frame reused or destroyed. Often wax moths will eat into wooden frames and the result is a weakened frame. If enough damage is done to wooden frames by wax moths, the wooden frames should be burned.

For honey super combs, the queen should normally be kept out of the supers with a band of honey or a queen excluder. Extra honey supers should be removed toward the end of the nectar flow to force the bees to store honey in the feed chamber super and brood chamber. This will also keep the queen from laying in the honey supers.

Scrape the detritus off the solid bottom board after wax moths have eaten comb or every Spring with a hive tool. Screened bottom boards are not as bad; detritus mostly falls through screened bottom boards.

Wax moths can consume dark comb on plastic foundation. After the moths are finished, the plastic foundation is recoated with a heavy beeswax coat. I typically use beeswax foundation in brood chambers and plastic beeswax foundation in honey supers. Plastic super foundation does not "blow-out" in the honey extractor as easily as beeswax foundation.

Dr. Tom Seeley, a professor at Cornell University, was concerned about plastic foundation inhibiting comb vibrations produced by workers doing their waggle dances (15Hz body vibrations). He determined that plastic foundation does not inhibit these comb vibrations – the bees' communications with waggle dances are not disrupted. Dr. Seeley also determined that colonies given beeswax foundation in wooden frames produced more honey than colonies given plastic foundation in

In recent years we have found that drone cells only marginally impact honey production.

Medium super frame that is reusable.

Deep frame that is reusable but note the holes. Some drone cells will be filled into the holes.

Deep brood frame that is reusable; bees have not drawn out all the cells.

Medium feed chamber comb. Note the dark cells where brood has been raised. Comb is reusable.

Plastic foundation that does not have enough beeswax coating. Note the Cross-Burr comb due to bee space violation and not enough beeswax coating on the plastic foundation.

Deep super brood comb. Drone cells will be built in the comb gaps. This comb is reusable.

plastic frames. He also determined when approximately 80 percent of the existing comb in a colony's nest is full of honey, the bees will start to build more comb during a nectar flow. It takes time and bee/honey resources to build comb. The bees will not build more comb unless they need it and they can afford to do so. This is why it is very difficult to get the bees to draw out more comb unless there is a nectar flow.

The plastic foundation with comb should be scraped to the plastic midrib. The foundation should be brushed clean and then the beeswax can be applied. Do not reuse frames and foundation that have been exposed to American Foulbrood (AFB) due to the resilient American Foulbrood spores.

When recoating plastic foundation with beeswax, apply a very liberal coat(s) of beeswax. The beeswax may be applied with a bristle brush, a foam brush, or by dipping into a double boiler with melted beeswax in the top pot. Recoating frames with beeswax should be done in a location where it does not matter if beeswax splatters on the floor or adjacent surfaces – beeswax is very difficult to remove. If purchasing plastic foundation, apply three beeswax coats to the plastic foundation. The bees will use the beeswax coating to draw out the comb.

When recoating plastic foundation with beeswax, apply a very liberal coat(s) of beeswax.

Reusable deep brood frame.

Medium super frame that needs cleaning and rewaxing.

Deep brood frame where the wax should be salvaged and frame reused or destroyed.

Deep frame where the frame should be cleaned and another sheet of foundation should be inserted.

Wax should be salvaged and the frame destroyed due to damage.

What size super/frames to use for the brood chamber and honey supers needs to be determined. The beekeeper needs to match the honey super-size to the location's typical nectar flow and the amount of honey needed to get through winter. Also, consider what the beekeeper can lift and handle.

For wax moths, temperatures between 5°C. (41°F.) and 18°C. (64.4°F.) result in no developmental activity. Wax Moth eggs are not able to hatch at temperatures below 18°C. (64.4°F.) When the temperature cools to below about 64°F., the beekeeper has fewer worries about wax moth damage. Below 41°F. (5°C.) wax moth larvae are completely dormant.

This means wax moths are an issue in most of the southeast during warm weather. Your best defense against wax moths is a strong colony. A strong colony is defined as a colony strong enough to defend the volume of its hive. For some colonies that may mean multiple 10-frame Langstroth hive bodies; for weaker colonies it might mean a five-frame nucleus hive with a one bee space entrance reducer. The beekeeper should be mindful of matching colony population to the appropriate amount of hive space they must defend.

Managing Beeswax Comb Is A Critical Part Of Beekeeping

Beekeepers need to protect the comb acquired from colony dead-outs if at all possible. The combs can be frozen or let light and air access the frames which inhibits wax moth development. Another option is the use of paradichlorobenzene (PDB) crystals (don't use anything with naphthalene in it) if you plan on stacking or storing hive bodies of drawn comb. If the comb is left in a closed hive, wax moth damage will occur especially on the dark comb where brood has been raised resulting in the loss of the bees' legacy and the beekeeper's greatest asset–drawn comb.

Managing beeswax comb is a critical part of beekeeping. Combs with 1/8 to ¼ damage due to wax moths can usually be salvaged. However, the bees will build drone comb in the holes and voids due to not enough drone cells in a typical colony. Combs with greater than ¼ percent damage should have the beeswax scrapped and the frame reprocessed if possible or destroyed. The beekeeper should burn frames and wax that has been exposed to American Foulbrood. Combs should be protected from wax moths in warm weather by freezing, exposure to light and air, or placing the combs on a hive with enough bees to patrol the extra comb surface area. BC

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

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Do I Need To Reassess Goals?

Zachary **Lamas**

Be Willing To Be Reflective

The Winter is a great opportunity to step back from the day to day toils the bee season imparts on us. I find this is the most reflective time for me to make long term decisions about myself and my bees that I can't during the season when I am hustling from yard to yard with a hive tool in my back pocket and unanswered e-mails in my inbox.

In fact, as a general rule, us humans are pretty bad at making great decisions while under stress. We make the best decisions we can at the time, but the fact is, the part of our brain that is excited during times of stress isn't the part we want turned on for long term decision making.

We benefit when we take a step back, take a breath, and have a degree of separation from our occupation and who we are as a person. To me, Winter is a gift. I have time for reflection, reassessment of my goals and long term planning all while my bees are clustered for their Winter respite. So for the next two months when I am not in colonies, I'll do the business and life planning that I owe to myself.

I want to embrace a positive view of myself and my bees for the next season, and I want that mindset to start now. The title of this article isn't an accident. I started the fall prep for my colonies in mid-August this year. Unites, feeding and treating was all done in time, and the colonies looked great. Unfortunately, I made a common blunder. I treated colonies because their mite level were above recommended thresholds, but I neglected to test the efficacy of the treatment afterwards. I wasn't aware of my mistake until mid-October. It was too late to fix a few of the colonies by then. The days are too short, the temperatures too cold, and the queens have naturally shut down.

I did what I should have done in every other season when a blunder I made turned out to be a consequential mistake. I grabbed my yard book from my truck, and wrote, "Do I need to reassess my goals for 2020?" It only took a few minutes against the warm hood of my vehicle to journal. I wrote down the work values I really wanted. I jotted down financial goals versus my financial needs. In a few minutes, I felt just as centered and positive about the upcoming year as I had before noticing some unexpected fall deadouts.

Embarrassingly this isn't how I have always been. I would hyper focus on yards that swarmed too much. Or I would run the gamut of *should of, would have, could have* scenarios in my head. That behavior really prevented me from being a great beekeeper. It meant I was always going to have a mindset where obstacles were there to impede me.

Over the next two days I checked all my yards, and created a new fall yard sheet for the operation. Overall the number of strong, medium and weak colonies didn't change that much. There were a couple surprises; some strong colonies the mites had severely affected. I united and treated them. But overall, everything was going to be fine. I decided to take 20% fewer nuc orders for 2020 than I originally planned. I'm confident I will still make my financial needs.. I value quality work time in my apiaries over hustle and bustle *rush, rush, rush* time. So I decided to move back my earliest nuc orders by a week in the spring. It will give me a little bit of a buffer to stay organized.

I took about 15 minutes writing in my yard book on the hood of my truck that day. Those few minutes were very valuable. I got myself centered so that I could look at the big picture. My mindset was positive. I only had to

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make minor changes for the upcoming season. I finished working that day focused and still very excited about 2020. What would have happened if I did not pause? I could have very easily continued working down the row of colonies, and choose to hyper focus on the weak ones. If I did that, I wouldn't be writing this article.

So this Winter I am prepping equipment for the next season. I am getting organized now. I'll start prepping colonies in February. Our bees and beekeepers are resilient, and the Spring offers us the opportunity to rebuild. In between I'll enjoy the days when I am not indentured to beekeeping tasks, I'll be reflective, and be willing to move that goalpost if I need to. BC

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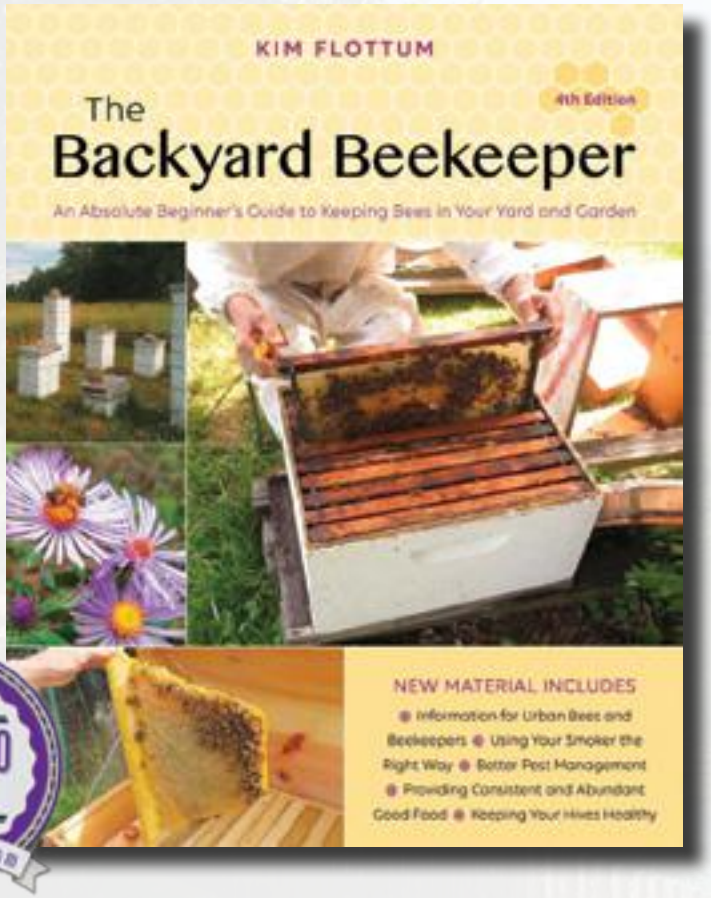

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OUR BEEKEEPING ANCESTORS

Foteini **Svarna**

Greek beekeeping can be traced back to antiquity through written texts and archaeological findings which reveal not only the symbolic and significant role of bees in the ancient Greek civilization but also the existence of widespread, systematic beekeeping. In ancient Greece, bees played an important role in nutrition, medicine, economy, and religion. Since they were regarded as divine creatures and symbols of wisdom, immortality, prosperity, and sociability, they were surrounded by fascinating myths and legends.

When Zeus, the king of Olympian gods, was a baby, his mother, Rea, hid him in a secret cave on the mountain Ida, in Crete, to protect him from his father's menace. Melissa (the Greek word for "bee"), a mountain nymph, fed him honey and milk while other sacred bees protected him. Later, Zeus rewarded the bees by changing their color to bright gold to shield them from the cold climate of the caves.

Artemis Ephesia, goddess of hunting, wild nature, and the moon, was also associated with bees. Her arrow reminded her followers of the deadly sting of bees because it could bring sudden death. The priestesses who served in her temple, as well as the priestesses of the goddesses Demeter and Persephone, were called Melissae (Bees).

The Muses, deities of the arts, poetry and science, used to send bees to put drops of honey on a mortal's lips when they wanted to endow him with great eloquence, creative inspiration, and enthusiasm.

However, the god who is considered to be the first one who discovered the secrets of the bees and the art of beekeeping is Aristaeus, son of Apollo and Cyrene. He invented the beehive, the smoking tool, and a type of linen uniform to protect himself from stings. He introduced the practices of beekeeping in Greece and taught people the necessary skills to produce and harvest honey.

Hippocrates, Galenus, Democritus, and Pythagoras wrote about bees and honey. Homer, in his Odyssey, refers to "melikraton", a thick mixture of honey and milk regarded as a perfect food for children, and he also mentions that Circe used a similar concoction to seduce Odysseus and his companions.

Both Homer and Hesiod refer to wild colonies of bees in caves and oaks. Aristotle, a Greek philosopher and scientist, was the first person who studied carefully the bees and their behavior. In his texts there are many detailed observations about bees, their hierarchy, and their reproduction. Solon, an Athenian statesman and legislator, enacted laws about beekeeping, according to which apiaries had to be placed with a distance from each other of at least 100 meters, so there would be no doubt about the ownership of the beehives.

Besides the written texts, excavated materials constitute a proof that organized beekeeping was well established. An amazing gold Minoan pendant, discovered in the Necropolis of the Minoan Palace near Malia, in Crete, depicts two bees with their bodies curved towards each other, holding their round, granulated honeycomb between their legs and depositing a small drop of honey in it. It dates back to 1800 – 1700 BC and it is one of the most famous exhibits in the Heraklion Archaeological Museum in Crete. Moreover, it is argued that a gold signet ring which was found in Kalyvia, Crete, dating to the late Minoan period, depicts a horizontal beehive in a vertical position and a capture of bee swarms from a tree (Harissis, 2018). Bees were also engraved on Greek coins showing the prominent position they had in the trading and economy of ancient Greece.

Honey production has been recorded in Attica Basin, Isthmia, Kea, Crete, Leros, and Kalymnos. Attica honey was considered to be of the best quality because it was harvested without the use of smoke, which could alter the honey's taste and aroma.

Beekeeping equipment

Beehives

Archaeological excavations brought to light remains of mainly ceramic beehives. Beehives made of biodegradable material, such as boards of wood, hollowed logs, woven wicker, and cow dung, have not been preserved (Harissis, 2018). Though the main material was clay, beehives made of stone have also been found in some parts of Greece, such as on the island of Corfu. Stone beehives had their pros and cons. On the one hand, it was a laborious task to build stone beehives and almost impossible to move them. On the other hand, they were more stable, long lasting and extremely resistant to any attempt for theft. Moreover, stone was available everywhere and preferable when there was scarcity of other materials (Mavrofridis, 2018).

Archaeologists have identified two types of ancient ceramic beehives: horizontal and the vertical.

Hesiod mentions the "simvlous", a man-made type of beehive for collecting honey. Though it is not known what they looked like exactly, there is speculation that they belong to the vertical type of beehives.

GREEK BEEKEEPING

Horizontal beehives

Horizontal clay beehives have been found in many places in Greece, such as Attica, Euboea, Isthmia, Crete, and on other Aegean islands. They date back to the 5th century BC. The clay horizontal cannon beehives found in Crete were open at both ends. The ends were sealed either with a stone plate and mud, a wooden lid and mud, or a ceramic disc. On the front end, there was one or more small holes to allow bees to fly in and out. The back end enabled the harvest of honey. Bees attached their honeycombs to the interior roof of the beehive. Some archaeological findings give evidence that, sometimes, beekeepers placed little wooden bars across the walls of the beehive to stimulate the bees to build their combs parallel to the open ends of the beehive. During harvesting, the beekeeper used a smoker to remove the bees from the back end and drive them to the front of the beehive. Horizontal beehives were kept stable with the use of rocks, trees, or walls (Harissis, 2018; Rotroff, 2006).

In some areas, such as in Attica, on the Dodecanese islands, and on the Cyclades islands, they were put in special cavities in the wall of courtyards (Mavrofridis, 2018). According to archaeological data, the type of post-antique horizontal beehive in Greece has not altered since the classical period (Francis, 2001). Similar types of beehives were in use on many Aegean islands until recently; on the Cyclades and on the Dodecanese islands horizontal beehives were common until the 1960s.

Apart from ceramic and clay horizontal beehives, stone beehives were also used in many parts of ancient Greece, such as on mainland Greece as well as on the Aegean and Ionian islands.

Vertical beehives

Vertical beehives date back from the Archaic to the Hellenistic period and remains have been found in Attica, Korinthia, Chios, and Delos. They usually had the shape of a bucket or flower pot with a cflat and solid base, and broad and flaring rim. There was a hole near the base which allowed the bees to fly in and out. The beekeeper placed laths across the open mouth of a vertical beehive, so as the bees could build their honeycombs on them and hung them down into the container. The honeycombs had no contact with the walls of the beehive. Such a construction enabled the removal of honeycombs and the replacement of full bars with empty ones. They also placed a flat rock, or mud, or a ceramic lid on the open mouth of the beehive to shield the bees from adverse weather conditions (Harissis, 2018). The type of vertical beehive with movable laths is regarded as the precursor of the modern beehive with movable frames (Ifantidis, 1983). Similar types, known as "vraski", or "anastomo kofini", or "ypseli", or "melissokofino", were in use in Attica, Crete, and Kea up to recent centuries (Harissis, 2018).

Beehives in front of a complex of vaulted stone structures at the area of "Megalie Velanidici," in Magnesia, central Greece.

Smokers and other paraphernalia

Archaeological findings show that beekeepers in ancient Greece used smoking tools to pacify bees and harvest honey without being stung, with the most primitive technique to be the use of a type of torch. However, since torches could damage beehives and scorch the bees, other types of burners were finally employed that directed the smoke carefully onto the bees. Many of them had a handle; when the smoking devise was too hot, the beekeeper held it from the handle (Harissis, 2018).

The oldest smoking pot, dated back to 4500 – 3300 BC, was found in Sesklo, a Neolithic village in central Greece. On Skyros island, archaeologists brought to light an open vessel with traces of burning, dated back to the Hellenistic period, which was used as a smoking tool for bees. Smokers were also found in a tomb at Vonies in Karpathos, dated to the late Minoan period, as well as in Chania, Zakros, and Knossos in Crete.

Additionally, during the Hellenistic period beekeepers in ancient Greece used clay plugs with many holes. They put them on horizontal beehives to protect the hive from the wasp *Vespa orientalis*. Similar plugs were used by Greek beekeepers on some Aegean islands till some decades ago (Mavrofridis, n.d.). Archaeological excavations have also brought to light vessels and jars which were used to store honey.

Methods and practices in the passage of years

Beekeepers in ancient Greece, just like their counterparts in current years, used to move their hives to different locations, covering any necessary distance, taking into consideration the altitude of the place, the season, the environmental and weather conditions, and the abundance of bee-plant species, in order to ensure that bees have the necessary nutrition to maximize honey production. For the transportation they used animals or boats.

In ancient Athens, beekeepers placed their beehives on their roofs, protecting them from thieves and enabling bees to fly higher without

annoying people (Mavrofridis, 2018). In Crete, they placed their beehives in protected, enclosed areas known as "melissokipi" (bee-gardens). In many cases, the walls surrounding the "melissokipi" exceeded the height of two meters (Mavrofridis, 2016).

There are also references (Mavrofridis, 2016) mentioning that beekeepers in Crete, from the 17th to the 20th century, used vertical beehives with movable honeycombs as well as horizontal ones with fixed honeycombs, clay smokers with two openings in which they put horse or cow dung as burning material, a metal tool to cut honeycombs similar to current scrapers but longer than them, and a mask made from curved, parallel metal wires or very thin linen cloth. They extracted the honey from the honeycombs by pressing them by hand in a basket placed on a vessel to drain the honey. After draining, they sprayed the honeycombs with warm water to dissolve the remnants of the honey, boiled the dirty wax, put it in a wax-bag which served as a type of filter, pressed it on a board with a piece of wood and they had the final filtered wax, free from any unwanted material. However, around 1930, traditional beekeeping in Crete started to be abandoned due to new governmental policies (Mavrofridis, 2016).

From antiquity to the present day, thanks to the rich vegetation, the diversity of indigenous flowers, herbs, and bee-plant species, and the consequent high production of honey, the art of beekeeping is an important factor for Greek economy. Over the years, the production of honey has become more professional and the number of beehives has doubled.

Nowadays, beehives have been upgraded and, during the last century, there was an increase in the number of movable frame beehives. Beekeepers use Langstroth beehives but they still follow some old practices and traditional methods of production, avoiding the use of artificial ingredients, insecticides and chemicals. They frequently carry their hives from place to place travelling around Greece. Depending on the weather and environmental conditions, and following the bloom, they move their beehives four to six times a year.

The honey produced in Greece comes mainly from honeydew from thyme, honeydew from aphids on fir trees, pine trees, wild bushes, and a great variety of flowers and herbs. It is of high and stable quality with exceptional aroma and a unique taste. BC

Beehives in an orchard.

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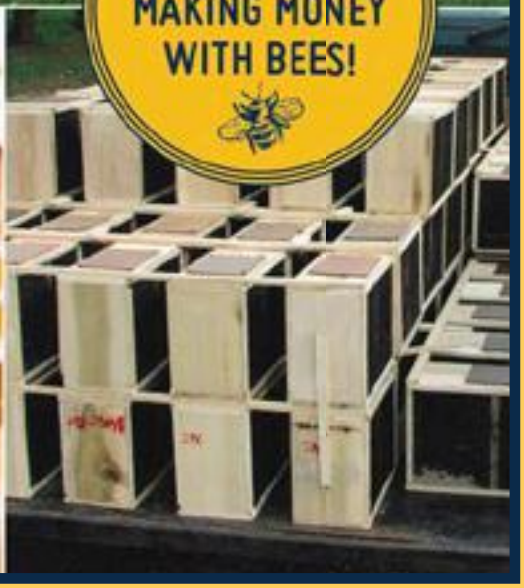


North, South, East, West

Snow, Microclimate, Colorful Hives

It's February. Some beekeepers will be using skis or snow shoes to pay a visit to their hives, Others are preparing honey supers. So there is not one answer to what every beekeeper should be doing during this month.

Yes, having a library of books is a very good idea for every beekeeper. But can a book cover all the climates and weather throughout the United States? Not really. So it's up to you to know what is going on in your area. And then, in spite of what your local weather reporter says, you actually live in a microclimate. Your bees know this very well. They are attuned to their own microclimate. So are the plants your bees depend on for their food, pollen and nectar.

Microclimates can be shaped by land, such as hills, rivers, forests. They are also influenced by villages, towns and cities. You may have some bee plants blooming a week or two before your beekeeper friend who lives only a few miles away. Your bees are paying attention to the plants surrounding them. Are you? Our lives are busy with many different things but take some time to notice what is happening in your bees' world. Let your microclimate be the guide to starting your bee season. Actually keep it into consideration all the time since it influences your honey crop and also other bee work throughout the seasons.

Take a different road the next time you go on an errand. You might see some plants blooming before those near you – or it may still be a winter world. Take time occasionally to drive in different directions from your home. Farmland changes. Meadows with flowers may now have crops. If your roads are covered with ice and snow, just wait a bit. It all will eventually melt. However during the year keep thinking about keeping up with that really huge area that your bees visit for their food and your honey crop. It's easy to blame the bees for a poor honey crop but it might not be their fault.

For those who are just finishing cleaning up equipment for the coming bee season have you given some thought to the latest on the woodenware we've been using for many years? You did use some bits and pieces of old brood boxes as firewood this winter? Replacements were ordered and assembled. Quite a few beekeepers are now roughing up the insides of brood boxes so that the bees are encouraged to coat the surfaces with propolis.

Taking advantage of the properties of propolis can really help the bees live in a clean environment, even though we've always thought of propolis as a sticky, gummy nuisance.

Giving the bees an excuse for living in a clean (to them) environment can mean healthier bees. There is no need to carve deep gouges on the inside of brood boxes – a quick scrub with a wire brush will be enough encouragement. Old brood boxes probably already have a thin coat on. Go ahead and paint the outside as you usually do.

Just a few quick thoughts about your choice of colors for your hives. Beehives really do not have to be painted white unless you live in a hot climate. There the bees will benefit from a light color. Now before you select a color for the outside of your hives, go back to your books and read about the colors bees can see best and which ones they see very poorly. Let that information guide you in the colors you select for your hives. Keep in mind the "background" for those hives. Bees who are returning to their hives see them as something separate from what is behind and to the sides of their own home hive.

In the cold snowy north have you seen any clues to colony losses so far? Remember that a small number of old bees die each day. While you are out in your snow shoes you can try the "thump test." A sharp thump with a fist should bring a buzz from the bees inside. If so, all is probably OK unless you fear they may be short of honey stores. If no buzz, even on a second thump, then it may not be alive. Weather conditions permitting, opening the top cover may give you more information.

If it is dead, can you block the entrance until weather allows you to make a complete diagnosis. Then, if not diseased, you can use its stores for another colony that is running short on food. However, if any question about disease do not take a chance. It is easy to overlook something important

in the middle of your Winter.

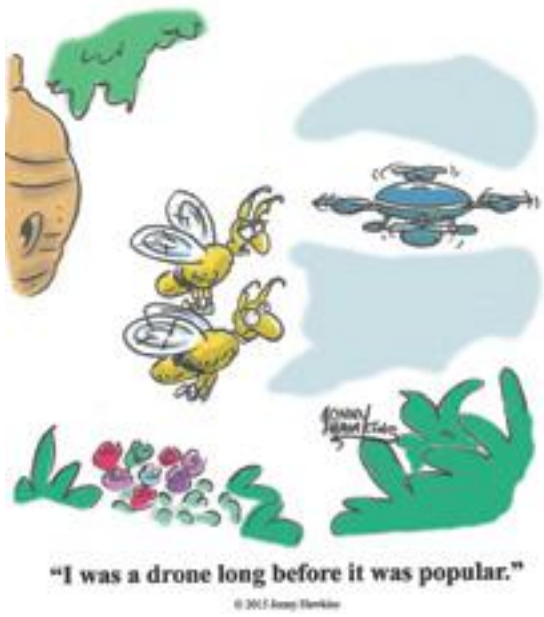
In the warm south, parts of a few other states, your bee season is well underway. In some parts of the U.S. it may be about time to put honey supers on. How has your weather been? Any freak frosts? Have you paid attention to recent rain? How is your queen performing? At this time of year in your climate, you can be making plans for a change of queens. Local queens are now becoming popular so if you wish to buy some from a local beekeeper now is the time to reserve some. In a warm climate you do have a longer period when requeening can be done.

However with the warmth other problems arise. What about the small hive beetle in your area? Take action before it gets to be a major problem. You also may be in fire ant country. Agriculture extension agents have information on those.

Some thoughts for those who are urban or rooftop beekeepers. Cities often change their park plantings. Fortunately today cities have become more bee-friendly. But the park planners still have to consider what they have done in the past that has brought pleasure to the city inhabitants. Get in touch early in bee season with the city park planners to see what their plans are and if they need any suggestions for attractive but useful bee plants in their park planning for the coming year.

Attend your local beekeeping club meetings if possible. Yes you may not agree with all the beekeepers who attend but listen because it makes you think about why you disagree. And that is good for your bees. They are in your care. You can help them survive by understanding your climate and your microclimate. Start becoming aware of that to help you understand your bees' actions and their lives. BC

Ann Harman continues to give us ideas on how to be better beekeepers from her home in Flint Hill, VA.



Complaining About A Problem Without Posing A Solution Is Called Whining

Teddy Roosevelt

From The Editor . . . Cont. From Pg. 15

need for my lab. I told them that their support was appreciated, but tongue-in-cheek replied that I did not really have room for more equipment – what I needed was a new lab. At the time, I did not really appreciate how this seed would take root and grow to what it ultimately became, a new honey bee laboratory at UF.

Laurence and Gordon took the idea to the Florida State Beekeepers Association, where the idea seemed to gain quick support. The FSBA leadership put together a lobbying effort to try to secure funding from the Florida State Legislature. To do this, they needed an approximate square footage and cost for the building. So, I worked with UF/IFAS facilities personnel to develop a rough sketch of a 10,000 square foot, $3.5 million building. The FSBA, wisely, partnered with hobby and commercial beekeepers, the University of Florida, and various other groups to develop a lobby plan for the building.

With the plan and partners in place, the FSBA took that information to the FL Legislature and secured $2.5 million in support the first year they attempted. However, the governor at the time vetoed the facility. That was a crushing blow to our optimism. The idea of a new lab had support everywhere it seemed, everywhere except the governor's office. Not deterred, the FSBA tried again a second year and managed to secure $2.5 million in support, only to have the governor veto it a second time. Honestly, that was the most difficult blow. We had tried twice, but to no avail. It really looked like the idea was dead for good.

To our surprise, FL State Senator Alan Hayes suggested the FSBA try a third year. That year, the state allocated $2 million to the project with the caveat that the beekeepers contribute $200,000 and the University of Florida contribute $500,000. All parties agreed and this is the proposal the ultimately made it by the governor's desk.

Despite our success, we had $2.7 million of a $3.5 million+ building. So, the FSBA and its partners went back to work. They created a fundraising committee composed of beekeepers and other partners who, with unrestrained support of the FL beekeepers and additional financial support from UF, raised an additional $2 million! All-in-all, we now had $4.5 million in hand!

In October 2017, ground was broken for the new lab. We moved into the first of three buildings in June 2018, just nine months later. Three months after that (September 2018), we moved into the final two buildings. At the end of the day, the $4.5 million built three buildings that total over 16,000 square feet of space, a 60% improvement over what we intended to build in the first place. The first building (>8000 square feet) contains a huge research laboratory, associated research support space, office space for the UF bee team, a teaching classroom, a conference room, graduate student and visiting scholar office, and a large observation hive room that can accommodate 12 observations hives (light and climate-controlled), and other support space. We also have a teaching pavilion (~1,400 square feet) that seats 150 people and a third building (>6,000 square feet) that includes a workshop, a honey extraction and processing facility, offices for the state's bee inspection program, and a beekeeping museum.

Most of these spaces were made possible by individual or beekeeping industry donors who sponsored rooms for naming rights. I cannot stress to you enough how amazing it was to see individual beekeepers, local bee clubs, state bee clubs, etc. get behind the building and actually support its development financially, and with their time, etc. I am forever indebted to the beekeepers who believed in us enough to support this effort. So many people worked to make this a reality. I would need a separate column just to acknowledge everyone. Consequently, I just want to give a blanket "thanks" to everyone who was involved.

Working colonies with Mathias when he was four years old. Jamie involves his kids in his professional life. They work bees with him and travel with him to various bee meetings all around the world.

JH – Amazing! What public and Florida Beekeepers, UF, students, support and encouragement from your family has resulted in. And it's not over yet. Last question, what would you like to leave with *Bee Culture* readers?

JE – Fundamentally I want *Bee Culture* readers to know that scientists need beekeepers to help them be more successful. Scientists need to know what beekeepers need and the only way that can happen is to have an open and free dialogue based on trust. By the same token, beekeepers cannot just tell a scientist what they need and expect the scientist to have the resources to get it done. They have to be active and collaborate with the scientist to move the project ideas forward. How? Lend colonies to the scientist. Help with field research and trials. Finally, remember that research is not free. Labs still have to pay the electric and water costs, student scholarships, truck repairs, materials, supplies, etc. The list goes on and on. It is truly a collaborative process. Without beekeepers none of what we do at UF would be possible. I am truly blessed.

Bee-reavement

Gone, not forgotten.
The inquest revealed nothing.
The suspect, still at large,
seems to mock you.

The evidence: scant.
Many pests? Too few plants?
Their exit, so abrupt:
It's swiftness shocked you.

Now get back on the horse,
There's no time for remorse.
This bereavement, this loss,
It won't stop you.

Like a chest filled with gold,
Where was once black and cold.
Relentless beekeeper,
We salute you!

Peter Keilty

A storm approached from the southwest, the type of storm that makes a person living in a house built in 1897 uneasy while drifting off to sleep. The old oak tree within smashing distance of our bedroom began to wheeze and rasp in the wind. Rain pelted the clapboards as long pieces of far-off lightning illuminated the bedroom windows. Before long, thundered rattled the panes of glass. Through all of this, my wife Natalie slept soundly, as I tossed and turned between fears of a falling tree, leaking roof, and fire. Then one bolt struck and detonated a sonic boom right over our roof. After that, I hoped I was dreaming but wasn't. Natalie was suddenly awake too and both of our nostrils burned. We were choking and coughing.

"Is the house on fire?" Natalie stammered.

"No, that ain't smoke." I said, suddenly wide awake. "That's skunk."

Unbeknownst to us, a skunk had taken refuge from the storm under our house in the crawl space. When the bolt of lightning hit, the scared skunk sprayed a stench so intense that each breath of air burnt the capillaries in our lungs. Natalie, still somewhat confused and half asleep, suggested we stop, drop, and roll, but there was no rolling away from this smell. The stench penetrated and infiltrated everything in our old farmhouse. Months later, Natalie and I still dealt with the stigma from that night. In fact, if you're ever in need of an excuse to skip a wedding shower or birthday party, most people will understand your absence if you explain to them that the dry cleaners wouldn't accept your clothes for fear of contamination. It seemed no amount of airing on the clothes line was capable of completely cleansing that skunk scent.

And that night was only the beginning of the skunk's reign of terror. From all indications, this was a grade-A specimen of skunk with huge unwholesome odor glands and an oversized and deviant brain. Natalie's poppaw Lowry and I reckoned its smartness was above average because it found the only loose brick in the underpinning of our house to squeeze into the crawl space. After we secured the brick with mortar, we learned the vengeful skunk was capable of planning and premeditation. A few nights later, the skunk snuck next door to Lowry's house and unleashed another broadside attack outside his bedroom window. This was war.

Lowry and I began doing reconnaissance, periodically sweeping our yards at night with flashlights to see if we could spot the skunk. Near dusk, Lowry performed stakeouts around the farm in his Ford Bronco, his rifle in the passenger seat, to try to find it emerging from its hidden lair. The skunk always seemed one step ahead though. While we tried to secure our houses and yards, the skunk had moved on to the beeyard. Scratches began showing up on landing boards and a foul scent – not goldenrod – began wafting from hives. Like any good gumshoe, I spread some flour on the ground in front of the hives and checked the next morning. A series of paw prints in the flour were undeniable evidence that this skunk was not only killing bearding bees, but also using oversized claws to accomplish the crime.

Skunks, as it turns out, are undeterred by bee stings. Way back in 1929, another criminal gang of skunks gained notoriety by terrorizing the apiary at the University of California at Davis. Researchers from the university detailed the misconduct of these skunks in a paper entitled the "Bee Eating Proclivities of the Striped Skunk." The researchers used steel traps to catch four skunks in the apiary. They write, "All four of the trapped skunks had numerous bee stings em-bedded in the mucous membrane of the tongue, palate, and gums – a total of 65 stings was found in the mouth and throat of one of the specimens. The stomachs of two skunks were crammed with bees."

During our own battle with the skunk, Lowry and I set cage traps, trying different locations and types of bait. Racoons preferred honey buns. Possums liked Vienna sausages. Cats went for cans of tuna. We caught everything but the skunk.

But one night the brazen skunk returned to the original scene of the crime, our house. Natalie was putting laundry in the washing machine on the back porch and heard rustling in the shrubbery. She quietly came inside and tiptoed over to the bathroom window to peer outside.

"What are you doing? I asked.

"Sssssshhhh!" she whispered emphatically, "The skunk is trying to get under the house again!"

I tiptoed over to look. Sure enough, there was a skunk – a fat skunk, probably with a belly full of bees. Its white stripe, bushy tail, and pointy head all moved together in a sneaky manner as it probed the underpinning for more loose bricks. At one point, the skunk got tired of probing and decided to curl up for a nap in the space between the underpinning and heat pump. In the quietest argument Natalie and I have ever had, we debated what to do. I suggested sneaking out the front door and then going around back to shoot it. Natalie pointed out the dual facts that the gas line runs to the heat pump and I'm not a good shot. Then I suggested getting Lowry to come over to shoot it. But she said that

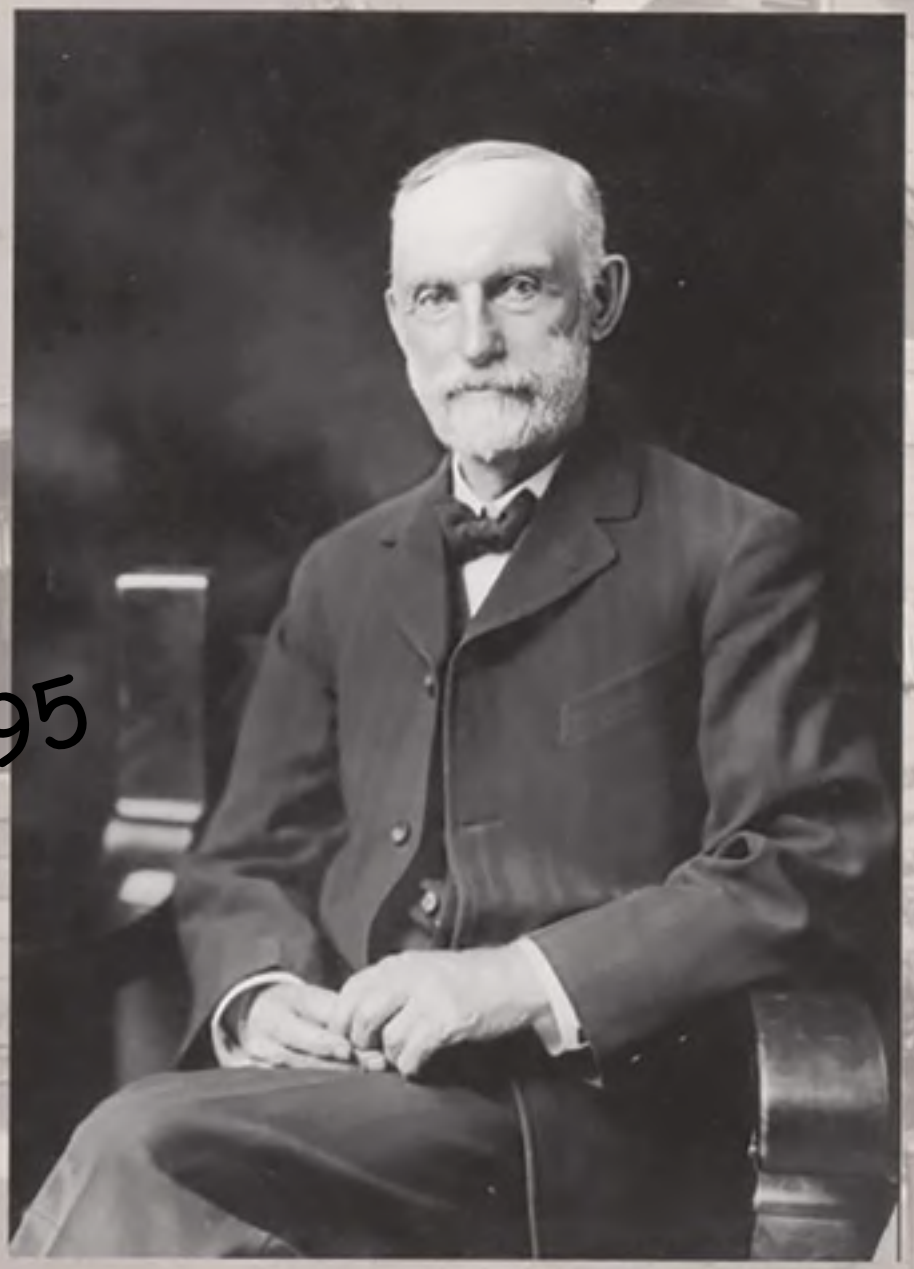
Grade-A Specimen

Stephen **Bishop**

even though he's a better shot, the odds of it spraying right beside the main air duct are high. Then the skunk got up and started scurrying around the under-pinning again. In the spur of the moment, Natalie hatched a ridiculous plan involving a granola bar that I assured her would never work. She quietly opened the window and began chucking pieces of a chocolate chip granola bar into the yard to draw it away from the house. Lo and behold, the skunk saw a piece of granola bar land in the grass and scurried over and pounced on it. It then began hunting for other pieces of granola in the yard. Meanwhile, she sent me through the front door with more granola bars to get the cage traps. My mission was to quietly litter the outskirts of the yard with granola bar pieces and then set the traps with bars as bait – all without scaring the skunk and getting sprayed and all while wearing a t-shirt, boxer shorts, rubber boots, and a headlamp.

I'd like to think it was my quick execution of the plan in boxer shorts that made all the difference. The next morning the skunk was indeed trapped. Over the next three nights, we caught three more skunks with chocolate chip granola bars, putting to rest the mystery of skunks' preferred bait and ending the reign of terror around our house and hives. BC

AN EYEWITNESS ACCOUNT OF EARLY AMERICAN BEEKEEPING



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CALENDAR

♦FLORIDA♦

Spring Bee College will be held March 6-7 at UF/IFAS Honey Bee Research and Extension Lab, Gainesville.

For more information visit **https://entnemdept.ifas.ufl.edu/honey-bee/extension/bee-college/**.

♦GEORGIA♦

Georgia Beekeeper Association will kick off their 100 year anniversary celebration at their Spring Meeting February 21-22 at Augusta University.

Speakers include Kirsten Traynor, Wyatt Mangum and Rachael Bonoan.

For information visit **http://www.gabeekeeping.com**.

♦ILLINOIS♦

University of IL Bees and Beekeeping Short Course will be held April 18 at the Bee Research Facility and the Carl R. Woese Institute for Genomic Biology.

The cost is $100. Must bring your own protective gear. Course is limited to 50 participants.

For more information and to register email **cundiff@illinois.edu** or 217.265.7614.

♦INDIANA♦

Heartland Apicultural Society (HAS) will hold their 2020 conference on the campus of the University of Southern IN, July 6-8.

Watch for upcoming details and visit **www.heartland-bees.org for more information**.

2020 IN Bee School XVIII will be held February 29 at Decatur Central High School.

Marla Spivak will be the keynote speaker. Program runs from 8:30 to 5:00

For more information visit **https://indianabeekeeper.com/events/indiana_bee_school_xviii**.

♦MICHIGAN♦

Kalamazoo Bee Club's Annual Bee School will be held February 15 at Kalamazoo Valley Community College, 8:00 a.m. to 5:00 p.m.

Featured speaker is Jim Tew.

For more information and to register visit **kalamazoobeeclub.com**.

MI Beekeepers Association will hole their Spring Conference March 6-7 at Kellogg Hotel and Conference Center, 219 S. Harrison Road, East Lansing.

Kirsten Traynor is the featured speaker.

To register visit **www.michiganbees.org**.

82nd Annual Southeastern MI Beekeepers Association will hold their conference March 14 at Wayne County Community College District Ted Scott Campus. The theme is 'Celebrating Women in Beekeeping.'

Keynote speakers include Kirsten Traynor and Marla Spivak.

For more information and registration visit **sembabees.org**.

♦MISSOURI♦

Eastern Missouri Beekeepers Association 13th Annual Beekeeping Workshop will be held February 7-8 in St. Louis.

Keynote speakers include Jennifer Berry, Kim Flottum, Gary Reuter, Becky Masterman, Bridget mendel Lee and Ana Heck.

The cost is $85/person, $95 after January 19. Banquet costs is $30/person.

For more information visit **www.easternmobeekeepers.com**.

Midwestern Beekeepers Association will hold their 25th Annual Beginning Workshop February 29 at Westminster Hall, 417 W. Lexington Ave, Independence. The cost is $65/person.

For more information and to register visit **http://www.midwesternbeekeepers.org**.

♦MINNESOTA♦

Beekeeping And More Symposium will be held February 15 at Fond du Lac Tribal & Community College, 8:30 a.m. to 3:30 p.m.

The cost is $20/members; $25/non-members.

Preregister online **www.signmeup.com**.

♦NEBRASKA♦

Beekeeping Workshops, UNL Bee Lab – Year 1 Beekeeping - Lecture February 1/Field April 25; Lecture February 15/Field april 4; Lecture February 21 & 28/Field April 17 & 24; Lecture March 14/Field May 2. Year 2 – Lecture March 21/Field May 16. Mead Making – March 28.

For more information visit **https://entomology.unl.edu/bee-lab**.

♦OHIO♦

Lorain County Beekeepers Association will hold their annual Beginning Beekeeping class Fridays, March 6, 13, 20, 27 at 7:00 p.m. at Life Church, 1033 Elm Street, Grafton.

The cost is $50.

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

♦OKLAHOMA♦

OK State Beekeepers Association will hold their Spring meeting in Duncan, March 21 at the First Baptist Church Family Life Center, 901 West Ash Street.

Guest speaker is Sam Comfort.

For information contact **tomokbees@gmail.com**.

The Big Bee Buzz will be held March 27-28 at Asbury United Methodist Church, 6767 S. Mingo Road, Tulsa.

Keynote speakers include Kim Flottum, Landi Simone, Reed Johnson and more.

The cost is $75/members, $85/non-members and $90 after January 16.

For more information contact Carol Jones, 918.844.5493.

♦PENNSYLVANIA♦

Introduction to Beekeeping February 8-9 and March 28-29 at Temple University, Ambler.

Vince Aloyo is the instructor.

For more information visit **http://vincemasterbeekeeper.com/courses/**.

♦SOUTH CAROLINA♦

SCBA Spring Conference will be held February 29 in Columbia at GPC Center, 17 Technology Circle.

Featured speakers include Lewis Barlett and Michael Bush.

For information visit **https://scstatebeekeepers.com/event/scba-spring-meeting**.

♦WISCONSIN♦

Dunn County Beekeepers will hold an "Introduction To Bees and Beekeeping February 8 at Menomonie Alliance Church.

The cost is $60/person, $95 after January 19. Banquet costs is $30/person.

For more information visit **www.dunncountybeekeepers.org**.

♦WYOMING♦

Wyoming Bee College will be held March 21-22 in Cheyenne, with a Pre-Conference Workshop held March 20.

The cost of the workshop is $125/person. The cost for the conference is $85/person or you can do both for $195.

Featured speakers are Phil Craft, Jamie Ellis, Scott Debnam, Reyah Carlson and more.

For information visit **www.wyomingbeecollege.org**.

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The Bear Was Outside

Ed **Colby**

Returning from the local vaudeville revue on a tomb-dark September night, I dropped the gal Marilyn and her two sisters at the house before I parked at the lower end of our very long driveway. Walking back to join them, I sensed a creature moving directly in front of me.

I figured it was Pepper the blue heeler, so I said, "Awww," because that's the way I talk to Pepper. When I nearly rear-ended my walking companion, I realized this was no herding dog. It was a bear! I stopped, and the bruin kept going. I shouted warnings to the girls up at the house, alerting them to stay inside. Everyone stayed reasonably calm. Judy did act a little concerned when the bear nonchalantly snooped around the front yard, standing on its hind legs as it sniffed our big poplar. Nancy's a wildlife biologist who's worked in Africa, so it would take more than a black bear in the yard to get her worked up. As for Marilyn, she's not scared of anything.

I won't say this was the biggest bear I ever saw, but it was certainly the fattest. It was so roly-poly it looked like a cartoon bear! We watched it through the window as it poked around and tipped over a mostly empty trash can, before vanishing into the night.

The next evening, as I walked into the bedroom, Marilyn held a finger to her lips. "Shhh!" She cautioned.

"What?" I whispered.

"Shhh!" she hissed. "Don't you hear that?"

"Hear what?" I asked.

I generally don't hear much, but then I heard it. Or maybe I did – heavy breathing, outside the open window, in the driveway.

I immediately had a worry. I knew the apiary solar electric fence charger was on, but was the basement door to our backyard carriage house latched? I had some full honey supers inside, and I didn't need a bear rummaging around looking for dessert.

I took a chance. "I'll be back in a flash" I cried, as I bolted out the door.

Then, standing outside, very near to the window through which we'd heard those sounds, I heard it again, but clearly. The unmistakable, heavy, sonorous rhythm of deep breathing, like Darth Vader whispering in your ear.

In an instant I found myself back inside the house, gasping for air. Marilyn looked at me. Was that terror in her eyes, or merely amusement? When she gave me that million-dollar Marilyn smile, we both broke down in laughter. Everything was OK. We were inside. The bear was outside. Life was grand.

Marilyn and I talk a lot about climate change. We wonder about the future of an Earth consumed by drought-induced catastrophic fire, an Earth wreaked by coastal flooding brought on by melting ice caps, an Earth deluged by increasingly violent hurricanes from rising sea temperatures. As our planet experiences increasingly dramatic hot-and-cold temperature swings, *average* temperatures worldwide get hotter and hotter. Is our time the beginning of the end of civilization as we know it? When Florida is under seawater in 20 or 50 years, where will the Floridians go? What happens when America, the world's breadbasket, can't feed itself because the Midwest is deluged by torrential rains, while in parched California the aquifers are sucked dry? What happens when a million climate-displaced refugees storm our borders? Can our society and institutions survive? Do we need to hoard guns and ammo?

Some speculate that global warming might be just a theory, or a grand hoax.

I won't argue. Man-made climate change is established science, which is to say universally agreed upon in the scientific community. Take it or leave it. The dissenting "opinions" of a handful of nay-saying "scientists" merely muddy the waters. Use a simple Google search to check their backgrounds and business relationships. Follow the money.

There's nothing tricky about the truth. Open your mind, and it stares you in the face. That, or it lies behind the veil of some grand conspiracy. I'll take the former. Ask a scientist a scientific question, and you'll get a scientific answer. If you ask a politician a scientific question, you'll get a political answer. If you're enamored of conspiracy theories, God help us all.

Our children bear the burden of our collective folly. They'll pay the price for the oil and gas and coal we burn, for our cheap plane flights, for our commuter lifestyles and for our stubborn refusal to live within our ecological means.

Some of our native bees fly on the cusp of extinction. A hotter planet with wild weather won't help their plight. Maybe our honey bees can adapt, just like they have to a thousand other environmental stresses. Maybe, like Tom Seeley's Arnot Forest survivors, they'll cope in ways we can't foresee. Perhaps we will, too. I hope so. I'm less concerned about our little darlings. It's us I'm worried about.

But enough of this dreary epistle! May I finish my bear story now? The day after my big fright, the wise Marilyn pulled me aside. "That spooky breathing noise never moved around. The wind was blowing. Ed, I know you got really scared when you went outside, and I know you thought you heard something, but seriously, I'm pretty sure it was just the wind."

Maybe. But gentle reader, there *is* something out there, something waiting. Open your eyes and ears. Look around. It's not a hoax. It's real, and it's not the wind.

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